



George Latimer, Westchester County Executive

General Requirements and Proposals
Information for Bidders
General and Special Clauses
Technical Specifications

Jackson Avenue Pumping Station Rehabilitation
Bronx Valley Sanitary Sewer District
Town of Greenburgh, New York

Contract No. 22-510
Bid Opening: March 27, 2024

By Bidder (Please Print)

Firm/Business Name: _____

Address: _____

For Official Use Only

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

Division of Engineering

SPECIAL NOTICE

County of Westchester
New York

ADDENDA TO THE BID DOCUMENTS

Addenda to the Bid Documents will be published on the Empire State Purchasing Group website at (<http://www.bidnetdirect.com/new-york>) **It is the responsibility of each potential bidder to check the website on a regular basis for further information relative to the bid documents including information relating to any and all addenda** prior to submitting its bid. All Bidders are deemed to have reviewed and considered all addendums in their Bid.

SUBMISSION OF BIDS

Bidders should not submit the entire bid document with its bid submission. Instead, each bidder is required to submit the full set of designated Proposal Pages. The Proposal Pages are denoted by a border and are titled on the bottom as “Proposal Page”. The Proposal Pages must be accompanied by the “Bid Bond and Consent of Surety” (as set forth in the Proposal Pages) attached to the outside of the sealed bid. A Bid Bond is NOT required for contracts of \$100,000 or less. Failure to submit in this manner may cause the bid to be rejected.

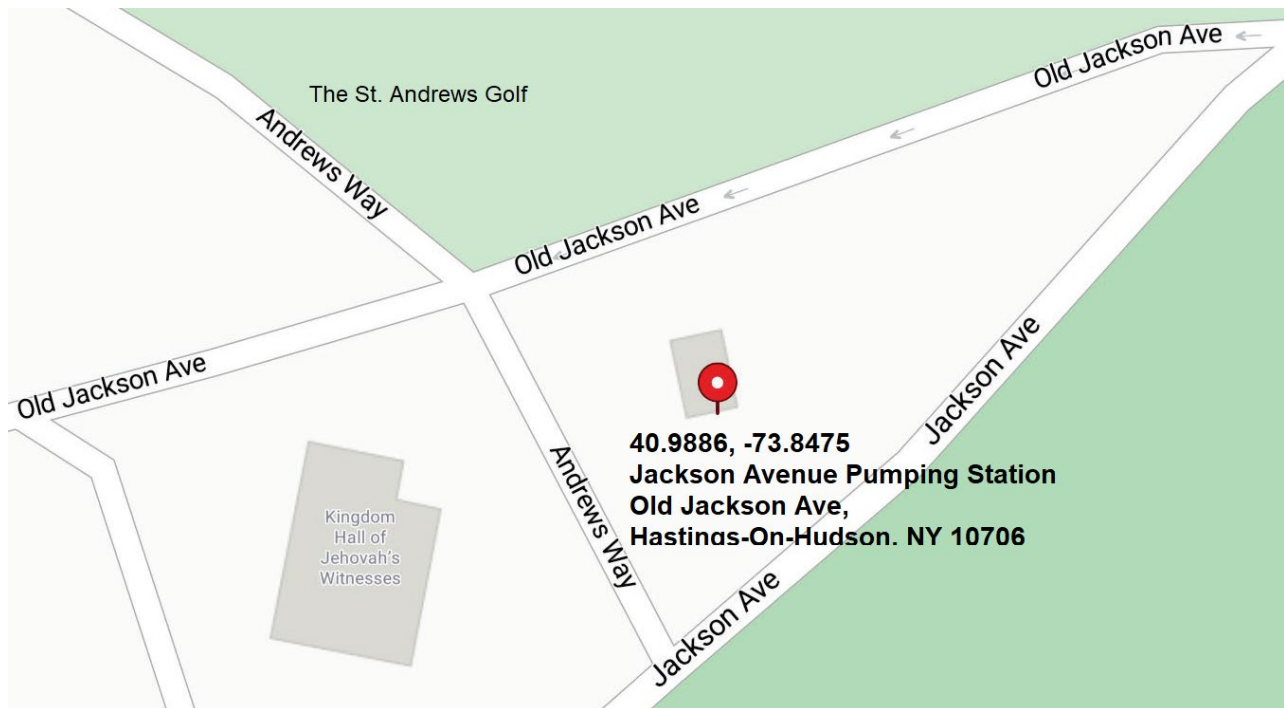
The successful bidder will be required to furnish a Performance and Payment Bond.

SPECIAL NOTICE

County of Westchester
New York

MANDATORY PRE-BID SITE INSPECTION

- A. Superseding the first paragraph of Article “3. PRE-BID SITE INSPECTION” of the Information for Bidders, Bidders are required to attend a Mandatory Pre-Bid Site Inspection at **10:00 a.m. Thursday, February 29, 2024 at the site, Old Jackson Ave, Hastings-On-Hudson, NY 10706 (40.9886, -73.8475)**, at which time they will examine the work site under escort by the County’s representative.



- B. **BIDS FROM CONTRACTORS NOT IN ATTENDANCE AT THIS MEETING, OR THOSE WHO FAIL TO SIGN THE ATTENDANCE SHEET-WILL BE *REJECTED***

- C. Bidders shall indicate their interest in the Mandatory Pre-Bid Site Inspection by contacting John Coelho, Department of Public Works and Transportation, Division of Engineering at (914) 995-5144.
- D. All other portions of Article “3. PRE-BID SITE INSPECTION” of the Information for Bidders shall remain in full force and effect.

SPECIAL NOTICE

County of Westchester
New York

MINORITY PARTICIPATION POLICY

Contractors must comply with the County's Minority Participation Policy, including, but not limited to, the requirement that contractors make a demonstrated good faith effort to utilize Minority Owned Businesses ("MOB") and Women Owned Businesses ("WOB") (see IFB Article 36). To assist contractors in this effort the County has made available a list of MOB and WOB at <http://mwbe.westchestergov.com/> Contractors are also encouraged to utilize other sources to identify potential MOB and WOB as subcontractors and suppliers.

All bidders must submit as part of their bid package the Minority/Women Owned Business Enterprise Questionnaire located in the Proposal Page section of the bid documents.

SPECIAL NOTICE

County of Westchester
New York

CHANGES IN THE WICKS LAW

Effective July 1, 2008, construction contracts of one million five hundred thousand dollars or less will not require the preparation of separate contracts for plumbing and gas fitting; steam heating, hot water heating, ventilation and air conditioning apparatus; and electric wiring and standard illuminating fixtures and general construction.

Each bidder on a public work contract, where the preparation of separate contracts is not required shall, to the full extent applicable, submit with its bid a separate sealed list that names each Subcontractor that the bidder will use to perform work on the contract and the agreed upon price to be paid to each for (a) plumbing and gas fitting, (b) steam heating, hot water heating, ventilating and air conditioning apparatus and (c) electric wiring and standard illuminating fixtures and (d) general construction. The submission (Proposal Page 6) that contains the agreed upon price shall be acknowledged by both Contractor and Subcontractor. For purposes of this paragraph, the acknowledgment from the Subcontractor may contain the facsimile signature of an officer of the Subcontractor.

After the low bid is announced, the sealed list of subcontractors submitted with the bid shall be opened and the names of such subcontractors shall be announced. Thereafter, any changes of subcontractors or agreed-upon amount to be paid to each shall require the approval of the County upon a showing of legitimate construction need for such change.

The Successful low bidder, before award of the contract, must procure and provide to the County, from each of the above denoted Subcontractors, a Contract Disclosure Statement and the Required Disclosure of Relationships to County forms.

The sealed lists of Subcontractors submitted by unsuccessful bidders shall be destroyed after the contract award.

THIS PROJECT IS NOT SUBJECT TO THE REQUIREMENTS OF THE “WICKS LAW”. ACCORDINGLY, EACH BIDDER IS REQUIRED TO SUBMIT SPECIFIC INFORMATION PERTAINING TO ITS PROPOSED SUBCONTRACTORS. PLEASE SEE THE “NOTICE TO CONTRACTORS” THAT FORMS A PART OF THESE BID DOCUMENTS.

SPECIAL NOTICE

County of Westchester
New York

COMPLETION OF GRANT FUNDING FORMS

The bidders are hereby notified that if this project, or any portion thereof, is funded by a grant then the contractor will be responsible to complete all appropriate forms as required by the grant agency in order to complete the application.

PROMPT EXECUTION AND RETURN OF CONTRACT

- A. The successful bidder is required to return the completed contract to the County within ten (10) days of receipt of the execution copy of the contract. The contract must be signed, notarized and returned to the County with all insurance certificates, bonds and supporting documentation, including all required Subcontractor information.
- B. The County reserves all of its rights, including, but not limited to, proceeding against the bid bond, if the successful bidder fails to submit the complete executed package within the above time frame.

SPECIAL NOTICE

County of Westchester
New York

MANDATORY OSHA CERTIFICATION

When a public works contract is in excess of \$250,000.00, all employees are required to have successfully completed the OSHA 10 hours training class. All contractors and subcontractors must attach copies of proof of completion of the OSHA 10 hour course by all employees to the first certified payroll submitted to the County and on each succeeding payroll where any new or additional employee is first listed. Employees may be requested by the County's representative to verify compliance with the OSHA 10 hour course by showing their OSHA card.

When a public works contract is in excess of \$1,000,000.00, all employees are required to have successfully completed the OSHA 30 hours training class. All contractors and subcontractors must attach copies of proof of completion of the OSHA 30 hour course by all employees to the first certified payroll submitted to the County and on each succeeding payroll where any new or additional employee is first listed. Employees may be requested by the County's representative to verify compliance with the OSHA 30 hour course by showing their OSHA card.

In addition, on any contract that includes excavation of underground facilities, the excavator is required to be certified and have completed the training and education program provided by the one-call notification system (Dig Safely New York, Inc. Certified Excavator Program in Safe Digging Best Practices) or any other provider authorized by the public service commission to administer such training and education program.

SPECIAL NOTICE

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BUILDERS RISK INSURANCE

In addition to the insurance requirements listed in Section 2 of the Information for Bidders, the Contractor, at their own cost and expense, shall provide and maintain a **Builder's Risk Form, All Risk Insurance Contract**. The coverage shall be written for **100% of the completed value**, with the County of Westchester named as loss payee as its interest may appear. In formulating its proposal, the Contractor shall include the costs for this coverage. In the event that claims, for which the County may be liable, in excess of the insured amounts provided herein are filed by reason of Contractor's negligent acts or omissions under the Agreement or by virtue of the provisions of the labor law or other statute or any other reason, the amount of excess of such claims or any portion thereof, may be withheld from payment due or to become due the Contractor until such time as the Contractor shall furnish such additional security covering such claims in form satisfactory to the County of Westchester.

SPECIAL NOTICE

County of Westchester
New York

**PROOF OF PAYMENT BY CONTRACTOR TO SUBCONTRACTORS
AND MATERIALMEN.**

In addition to and without limiting any of the provisions set forth in Section 23 of the Information for Bidders, after the Contractor completes 50% of the work under the contract, the Contractor may be required to supplement each requisition submitted to the County with documentation that establishes that the Contractor has timely and properly paid its subcontractors and materialmen as required by Section 23 of the Information For Bidders. Such documentation may include copies of both sides of cancelled check(s) paid to the order of the subcontractors and materialmen and such other documentation as may be reasonably requested by the Commissioner. If the Contractor fails to submit such documentation, the Commissioner may, in his sole discretion, withhold payment of the requisition until such time as the documentation is properly submitted. Nothing herein is intended or shall be construed to confer upon or give any subcontractor or materialman, or its successors and assigns, any third party beneficiary rights, remedies or basis for reliance upon, under or by reason of the contract or this Special Notice provision.

SPECIAL NOTICE

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New York

PREVAILING WAGE

All public works contracts are subject to the payment of the prevailing wage and supplements as set forth by the laws of the State of New York, including, but not limited to, Articles 8 and 9 of the New York Labor Law (the “Prevailing Wage Laws”). Westchester County has an active Prevailing Wage Enforcement Officer who enforces the Prevailing Wage Laws within the County for public works contracts, including reviewing certified payroll records, visiting job sites, interviewing the employer and employees (See IFB Article 12) and, if necessary, requesting copies of cancelled checks.

Any Contractor who fails to comply with the Prevailing Wage Laws, including, but not limited to, failing to pay the prevailing wage rates and supplements, failing to submit certified payroll records to the County or failing to post the prevailing wage rates and supplements at the work site, will be subject to enforcement as provided for in the Contract and laws of the State of New York through the Westchester County District Attorney’s office, the Commissioner of the New York State Department of Labor, the County and/or the employee who suffered the underpayment. This enforcement could include, but is not limited to, criminal penalties, civil penalties, debarment from future bid awards, the withholding of payment under the Contract to satisfy the unpaid wages and supplements, including interest and civil penalty. In addition, such a failure shall constitute grounds for cancellation of the Contract (IFB 8(C)). Moreover, a prime contractor is responsible for its subcontractor’s failure to comply with, or evasion of, the provisions of the Prevailing Wage Laws.

SPECIAL NOTICE

County of Westchester
New York

PROJECT LABOR AGREEMENT (PLA)

- A. The County of Westchester has determined that a Project Labor Agreement will be used on this Project. The successful bidder will be required as a condition of this Contract to execute the PLA with the Building and Construction Trades Council of Westchester and Putnam Counties, New York, AFL-CIO ("Council"). The PLA will be substantially in the same form as the PLA included in this contract specification book. Bidders are urged to familiarize themselves with the terms and conditions of the PLA.
- B. It should be noted that Schedule A of the PLA contains a list of the local unions affiliated with the Council. Copies of the applicable Collective Bargaining Agreements of the local unions can be obtained by writing to the Building and Construction Trades Council of Westchester and Putnam Counties, New York, AFL-CIO at 258 Saw Mill River Road, Elmsford, New York 10523, Attn.: Carol A. Bocca

CONTRACTOR SPECIAL NOTICE

Department of Environmental Facilities
Environmental Management System Requirements

General

The Contractor is responsible for complying and ensuring that all the Contractor's subcontractors comply with all federal, state, and local environmental and health and safety legal requirements.

The Contractor recognizes that the Department of Environmental Facilities (DEF) has an Environmental Management System (EnvMS) that includes DEF's Wastewater Treatment Plants (WWTPs), Solid Waste facilities, water treatment facilities, and related facilities and shall conform to and ensure the conformance of all of the Contractor's subcontractors (subcontractors) to the DEF Environmental Policy (Policy), all EnvMS associated procedures and protocols, and the requirements of this Special Notice. This includes the requirement to participate in the corrective action process, including attendance at meetings should activities in which the Contractor is involved result in a deviation from the Policy or the requirements of the EnvMS. Depending on the seriousness of the deviation, this may include participation in full root cause analysis.

Training

Prior to performing work the project superintendent, project manager and all responsible foremen for the Contractor and subcontractors shall attend a required 45-minute training session on EnvMS requirements provided by DEF Personnel. The Contractor shall ensure the attendance of these staff. The training may occur at the facility or at another location. The Contractor shall ensure that a minimum of one person who has participated in the EnvMS training is available on-site at all times that the Contractor's personnel or subcontractors are on-site.

The Contractor shall ensure that all employees and subcontractor employees working at any DEF facility are trained on the requirements of the EnvMS relevant to their work and shall keep records of training on site. The initial training for superintendents, project managers and foremen may be video taped by the Contractor for subsequent training of all Contractor's employees and subcontractor employees.

Records of training shall be kept by the contractor and made available to DEF, upon request.

Competency

The Contractor shall ensure employees and subcontractors are capable, based on training, education, licensing, and/or experience, to perform tasks that can impact the

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environment. The Contractor shall maintain records of competency and make these records available to DEF upon request.

Project Coordination

The Contractor shall designate a staff member who will be responsible for the oversight of EnvMS project requirements and to work as a liaison with the plant Superintendent or facility operator. This person, or their properly qualified designee, must be available anytime the Contractor's personnel or subcontractors are on-site performing work.

Working Environment

In addition to the hazards typically found on construction and industrial sites, the following specific hazards are present at the WWTPs and water treatment facilities.

Hazards	Yonkers	Port Chester	Peekskill	Ossining	New Rochelle	Mamaroneck	Blind Brook	Shaft 22	Kensico Dam	Gate of Heaven
Digester Gas (consists mostly of methane – the primary component of natural gas)	X		X							
Natural Gas	X	X		X	X					
Propane		X	X		X					
Oxygen					X					
Class 1, Division 1 Explosion Proof Areas	X	X	X	X	X	X	X			
Confined Spaces	X	X	X	X	X	X	X			
Chemical Storage/Hazardous Materials	X	X	X	X	X	X	X	X	X	X
Hydrogen Sulfide	X	X	X	X	X	X	X			
High Pressure Lines	X	X	X	X	X	X	X			
Open Tanks / Drowning Hazards	X	X	X	X	X	X	X			
Ladders, Platforms & Slippery Surfaces	X	X	X	X	X	X	X	X	X	X
High Voltage Electrical Systems	X	X	X	X	X	X	X			
Potential Exposure to Blood Borne Pathogens	X	X	X	X	X	X	X			
Automatic Equipment	X	X	X	X	X	X	X			
Chlorine Gas								X		

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Other DEF facilities (transfer stations, pump stations) may have these same or similar hazards.

The Contractor and subcontractors shall plan work appropriately for this environment and the specific location(s) where work is anticipated and implement the necessary health and safety precautions including, but not limited to, the use of proper equipment, including non-sparking tools, proper personal protective equipment (PPE) and monitoring equipment, and compliance with contractor Confined Space Entry and Lock-out / Tag-out programs.

Health and Safety Plan

The contractor shall develop a health and safety plan (plan) specific to the facility and the work planned and shall ensure that all work is performed in conformance with the plan. The contractor shall ensure that the plan addresses all relevant hazards including, but not limited to, the aforementioned hazards. The plan must be kept on site at the facility when work is being performed and must be made available to DEF personnel upon request.

Health and Safety Compliance Monitoring

An expert provided by the Contractor will monitor the Contractor and subcontractor compliance with all applicable health and safety regulations and the health and safety plan on an ongoing basis while the Contractor and subcontractors are performing work at any DEF facility. Monitoring shall be performed in accordance with the health and safety requirements in the project specifications. The Contractor shall ensure that all employees and subcontractors cooperate with the expert. The expert will document results of the monitoring and provide the results to the Contractor on an ongoing basis. The Contractor shall correct all health and safety non-compliances identified by the independent expert in a timely fashion. The monitoring results and any corrective actions taken shall be provided to DEF's representative on site.

Plant Equipment and Control of Hazardous Energy

All DEF sites are working facilities that must function at all times so as to meet regulatory obligations. The Contractor shall receive prior authorization from the WWTP Superintendent, the Supervisor of Operations, Chief Operator (water districts) facility manager (solid waste) if any planned activities of the Contractor or Contractor's subcontractor could interfere with the operation of the DEF facility, involve the use of plant or facility equipment, or require taking plant or facility equipment on or off line. The contractor shall not proceed without expressed authorization by same. DEF reserves the right to rescind authorization for the Contractor to use, work on, or otherwise render inoperable, any piece of equipment if needed for the operation of the plant or facility.

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The Contractor shall be responsible for ensuring control of hazardous energy (lock-out/tag-out) for all contractor and subcontractor activities. Contractor shall coordinate taking plant equipment off line and putting it back on line with the Plant Superintendent or the Supervisor of Operations, Chief Operator (water districts) or facility manager (solid waste). Only authorized DEF personnel shall take plant equipment off line or place it back on line. Plant equipment includes, but is not limited to, all gates, valves, pumps, electrical panels, solid waste facilities, water and wastewater treatment, and associated equipment.

Odor Notification

The Contractor shall notify the WWTP Superintendent, Supervisor of Operations, Chief Operator (water districts) facility manager (solid waste) or ISO Coordinator 24 hrs prior to the initiation of activities that have the potential to cause odors in excess of those associated with normal operations.

Odor Control

The Contractor and subcontractors shall comply with all EnvMS odor control requirements. WWTP doors must be kept closed at all times except for entry or exit of personnel and equipment. Open periods shall be minimized to the greatest extent possible. Doors shall not be propped open or held open without the expressed approval of the WWTP Superintendent or the Supervisor of Operations.

For activities with the potential to cause odors in excess of those associated with normal operations, the contractor shall plan and implement appropriate odor abatement controls.

Demolition

Contractor shall implement a methodology to tag or mark all equipment and piping prior to demolition. All contractor and subcontractor employees responsible for demolition activities shall be trained on the methodology. Prior to demolition, marked or tagged equipment scheduled for demolition shall be reviewed with DEF's representative on site.

Stormwater Management, Soil Erosion and Sediment Control Activities

The Contractor shall comply strictly with all Soil Erosion and Sediment Control project specifications; stormwater permit requirements, if a permit is required; and regulatory requirements including the ***New York Standards and Specifications for Erosion and Sediment Control and the County of Westchester Best Management Practices for Reducing Nitrogen and Other Stormwater Pollutants.***

Soil Erosion and Sediment Controls shall include, but are not limited to, the following:

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- Proper installation and use of erosion and sediment capture devices, i.e. silt fences and hay bales
- Protection of storm drain inlets
- Proper and timely backfilling and stabilization of trench excavation
- Inspections of discharge points
- Proper maintenance of erosion and sediment capture devices
- Regular inspections of controls by qualified Contractor staff
- Use of phosphorus containing fertilizers only in conformance with County requirements.

The Contractor shall be subject to Erosion and Sediment Control Inspections by DEF personnel.

Spills Prevention, Control and Response Procedures

Contractor and subcontractors shall have written spill response procedures that conform to DEF requirements. The Contractor's and subcontractors' supervisory personnel will be trained in the facility's Spill Prevention, Control and Response Procedures Requirements during the 45-minute EnvMS training session. Contractors and subcontractors shall ensure that these requirements are complied with and that their on-site employees are properly trained in spill prevention, control and response, and conformance with their spill response procedures. Contractor and subcontractors shall have a copy of these procedures available on site. The Contractor shall have appropriate spill clean-up equipment on site at all times.

In the event of a spill, the Contractor and subcontractors shall immediately respond to the spill in conformance with their spill procedures and as soon as possible report the spill to the main office.

The Contractor is responsible for proper clean-up and disposal of waste materials generated by any spill resulting from their activities.

Vehicle and Equipment Control

The Contractor and subcontractors shall ensure all vehicles and equipment are properly maintained and free of leaks. Contractor and subcontractors shall not perform fueling or maintenance of vehicles and equipment onsite without the expressed approval of the WWTP Superintendent or Supervisor of Operations, Chief Operator (water districts), or facility manager (solid waste). Contractor and subcontractors shall ensure vehicles comply with Westchester County idling restrictions and do not idle unnecessarily. The Contractor and subcontractors shall ensure all fuel used is ultra low sulfur in content.

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Good Housekeeping/Chemicals, Petroleum and Hazardous Materials Management

The Contractor and subcontractors shall demonstrate good housekeeping practices and perform daily site clean-ups at the work site. The work site shall be subject to inspections by DEF Personnel.

The Contractor and subcontractors shall properly store and use all petroleum, chemicals and hazardous materials. This shall include but is not limited to use of proper secondary containment and protection from precipitation. Storage locations shall be pre-approved by the WWTP Superintendent, Supervisor of Operations, Chief Operator (water districts) or facility manager (solid waste) or ISO Coordinator.

The Contractor shall provide all Material Safety Data Sheets (MSDS) for all petroleum, chemicals and hazardous materials used at the work site to DEF prior to bringing same on site and shall maintain all MSDS on site. DEF reserves the right to forbid any material from being brought on site.

At the completion of work, the Contractor shall remove any staged materials, petroleum, chemicals, and hazardous materials remaining from the project, whether a result of contractor or subcontractor activities. Staged materials, petroleum, chemicals, and hazardous materials may remain with the expressed written approval of the WWTP Superintendent or Supervisor of Operations, Chief operator (water districts) facility manager (solid waste).

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Waste Management and Minimization

The Contractor and subcontractors shall dispose of waste in a manner that meets all applicable laws and regulations including Westchester County Source Separation Law (Chapter 825). Contractors shall make every effort to minimize waste production during construction operations. Contractors and subcontractors shall not bring waste onsite and may not dispose of waste onsite or in DEF receptacles without the expressed approval of DEF

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Mercury Containing Devices

The Contractor shall ensure no mercury containing devices are installed. Any mercury devices removed by the Contractor or subcontractors shall be disposed of legally by the Contractor and records of disposal shall be provided to the facility.

Energy Efficiency and Environmentally Preferable Products

With the exception of exterior lighting and historic lighting at the South Yonkers CSO and the Mamaroneck WWTP, the Contractor shall ensure incandescent bulbs are not installed or used.

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The contractor shall:

- select energy star equipment or equipment within the upper 25 percent of energy efficiency as designated by the United States Federal Energy Management Program
- select environmentally preferable products
- utilize environmentally preferable cleaning products

if the prices of the equipment and products are reasonably competitive and the quality is adequate for the purpose intended.

The contractor shall ensure Styrofoam products are not utilized and shall request non-Styrofoam packaging for equipment and products.

Landscaping

When selecting plantings, the Contractor shall ensure plantings native to Westchester County are utilized. If no native species are appropriate, the Contractor shall ensure the planting of noninvasive species.

Pesticide Ban

The Contractor shall ensure pesticides that are banned under Westchester County Law (Chapter 690) are not utilized at the work site.

Change to Environmental Project Design Specification

The Contractor shall receive approval from an authorized County representative prior to making any modifications that affect environmental project specifications due to field conditions.

Third Party Audit

The EnvMS is certified to ISO 14001. The certification requires that a yearly third party audit be performed. The Contractor shall ensure that all employees cooperate with the third party auditor, answer questions put to them by the auditor, and make records required as part of this special notice available to the auditor, as requested.



WESTCHESTER COUNTY DEPARTMENT OF ENVIRONMENTAL FACILITIES

ENVIRONMENTAL POLICY

It is the mission of the Westchester County Department of Environmental Facilities to protect, preserve and conserve the water supply and quality of watercourses within or on the borders of Westchester County; to provide proper solid waste stream reduction and recycling; and to protect the health, safety and welfare of the public. The Department is responsible for planning, operating and maintaining: water resource recovery facilities, sanitary collection systems, drinking water treatment and distribution facilities, and solid waste facilities in compliance with local, state and federal laws.

To achieve this mission and thereby contribute to a more sustainable society, DEF is committed to:

- meet, and where practical, exceed its environmental legal and regulatory requirements, and other commitments;
- prevent pollution, protect the environment; and,
- continually improve.

A handwritten signature in blue ink, appearing to read "V. F. Kopicki", written over a horizontal line.

Vincent F. Kopicki, P.E.
Commissioner, DEF

NOTICE TO CONTRACTORS

County of Westchester
New York

Sealed proposals for the following construction work:

CONTRACT NO: **22-510**

ADVERTISING: **February 16, 2024**

MANDATORY PRE-BID INSPECTION: **February 29, 2024**

Jackson Avenue Pumping Station Rehabilitation Bronx Valley Sanitary Sewer District Town of Greenburgh, New York

will be received by the Board of Acquisition and Contract in Room 528, Michaelian Office Building, 148 Martine Ave., White Plains, New York until 11:00 a.m., **Wednesday, March 27, 2024**, and immediately thereafter, the bids will be publicly opened and read aloud in Room 527 of the said building. The bid opening also will be made accessible to the public via the livestreaming service WebEx. The livestreaming of the bid opening via WebEx is in addition to and not in place of the publicly bid opening to be held in Room 527 of the Michaelian Office Building. For additional bidding information or questions call (914) 995-2274.

Instructions for livestreaming via WebEx. Attendees may join by computer browser at <https://westchestergov.webex.com/meet/bac-bidopening> or by phone 1-415-655-0001 US Toll or 1-844-621-3956 US Toll Free. The Access Code is 614 981 028.

The Bid Documents (General Requirements, Information for Bidders, Technical Specifications, etc. with Authorized Proposal Pages) **MUST BE OBTAINED from the Empire State Purchasing Group website at the following web address:**

<http://www.bidnetdirect.com/new-york>.

There is no cost to the bidder for this service. Bid documents will be available after 1:00 p.m. on the advertising date.

PLEASE TAKE NOTICE: IN ORDER TO SUBMIT A BID, BIDDERS MUST REGISTER AND DOWNLOAD THE BID DOCUMENTS FROM THE EMPIRE STATE PURCHASING GROUP WEBSITE AND MUST REGISTER USING THE NAME OF THE PERSON OR BUSINESS ENTITY THAT WILL BE SUBMITTING THE BID. IN ORDER TO ENSURE THAT COUNTY BID DOCUMENTS HAVE NOT BEEN ALTERED IN ANY WAY, THE COUNTY WILL NOT ACCEPT BIDS FROM PERSONS OR BUSINESS ENTITIES THAT HAVE NOT FOLLOWED THIS REQUIREMENT.

The Bid Documents include Contract Drawings which **MAY BE OBTAINED at no cost on the Empire State Purchasing Group website at the following web address:** <http://www.bidnetdirect.com/new-york>, after 1:00 p.m. on the advertising date.

If the bidder is unable to utilize the electronic version of the Contract Drawings that are available on the Empire State Purchasing Group Website, the bidder may purchase copies of the Contract Drawings. Contract Drawings may be obtained from the Office of the Board of Acquisition and Contract at the above address after 1:00 p.m. on the advertising date and between the hours of 9:00 a.m. to 4:00 p.m. Monday thru Friday. Copies of the Contract Drawings shall be made available upon payment of a personal check, company check or money order made payable to the County of Westchester, in the amount of **\$100.00** per set. For bidders, the deposit for each set of drawings will be refunded in full if returned in good condition within thirty days after award or rejection of bids. For non-bidders, only fifty percent of the deposit will be refunded. No refunds will be made to the successful bidder.

Each bidder is required to submit the full set of authorized Proposal Pages and all bids over **\$100,000.00** must also be accompanied by the "Bid Bond and Consent of Surety" (as set forth in the Proposal Pages) attached to the outside of the sealed bid. Failure to submit in this manner may cause the bid to be rejected. **The successful bidder, no matter the amount of its bid, will be required to furnish a Performance and Payment Bond with its signed contract.**

The County of Westchester reserves the right to waive any informalities in the bids, or to reject any or all bids. No bidder may withdraw its bid within forty-five (45) days after the date of the bid opening.

Pursuant to Chapter 308 of the Laws of the County of Westchester, it is the goal of the County to use its best efforts to encourage, promote, and increase the participation of business enterprises owned and controlled by persons of color or women - Minority Business Enterprise (MBE) and Women Business Enterprise (WBE).

REMINDER: All required licenses should be submitted with the Bid.

COUNTY OF WESTCHESTER, NEW YORK
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

BY: Hugh J. Greechan, Jr., P.E., Commissioner

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Contract Drawings	Contract Drawings 1
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APPENDIX 1 – HAZARDOUS MATERIALS SURVEY



1. GENERAL REQUIREMENTS AND PROPOSALS

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

Division of Engineering

GENERAL REQUIREMENTS

1. DESCRIPTION OF THE WORK

Work under this Contract includes all necessary labor, materials and equipment required to:

The rehabilitation of the Jackson Avenue pump station generally consists of installation of new pumps, piping and valves and other miscellaneous mechanical upgrades, architectural and structural work to raise the first floor elevation of the pump station above the flood elevation, and electrical and controls upgrades.

It is not intended that this description of work mention each particular item required, but that it give information concerning the general scope and areas of work for the convenience of the bidders.

THIS PROJECT IS NOT SUBJECT TO THE REQUIREMENTS OF THE “WICKS LAW”. ACCORDINGLY, EACH BIDDER IS REQUIRED TO SUBMIT SPECIFIC INFORMATION PERTAINING TO ITS PROPOSED SUBCONTRACTORS. PLEASE SEE THE “NOTICE TO CONTRACTORS” THAT FORMS A PART OF THESE BID DOCUMENTS.

GENERAL REQUIREMENTS

2. SUBCONTRACTING & DIRECT EMPLOYMENT OF LABOR

The Contractor shall not subcontract more than ninety (90%) percent of its bid. The Contractor must directly employ at least ten (10%) percent of the personnel working on this contract as measured in man-days worked.

“Directly employ” shall be construed to include only workers employed and paid directly by the Contractor, usually for wages or salary.

The Contractor expressly acknowledges that any violation of this provision constitutes a default under this contract.

3. REQUIRED TIME FOR COMPLETION OF THE WORK

Notification to commence the work will require the mandatory submission of all the executed contracts and the Certificates of Insurance after receipt of authority to award.

The Contractor shall commence the work embraced in this contract within ten (10) days of the service of Notice by the County to do so and shall complete the said work within **560** consecutive calendar days computed from the date of such Notice to commence.

4. SECURITY REGULATIONS

Security Regulations For all County Facilities except County Correctional Facilities:

- A. Contractor's attention is called to the fact that this work is to be performed on property which is the responsibility of the County; therefore, all personnel associated with this contract are subject to special conditions affecting security and control of the facilities operations. Every person required to enter the work site will be issued an ID card and be required to fill out appropriate applications. **There is a \$30.00 processing fee for each lost ID card**; remitted by check made payable to the County of Westchester. All ID processing will be scheduled by the Construction Administrator.
- B. The Contractor/Subcontractor shall issue a copy of the security regulations (Paragraph C) to all personnel engaged on this project.
- C. All Contractor/Subcontractor personnel shall be bound by the following security regulations for the duration of this contract.
 - 1) All personnel must conspicuously display the ID card and identify themselves upon request.
 - 2) If an ID card is misplaced or lost, report this immediately to the Inspector.
 - 3) All Contractor/Subcontractor personnel are responsible for all tools and equipment and you must report any loss immediately to the Construction Administrator.
 - 4) All personnel must observe all orders of the Owner.

GENERAL REQUIREMENTS

- 5) All personnel are to report any unusual incidents or problems to the Construction Administrator immediately.
- 6) All personnel shall not possess or consume any alcoholic beverage or illegal drug or medication while on the property, or report to work under the influence of alcohol or drugs.
- 7) Any vehicle left on the property must be locked and the ignition keys must be removed. Vehicles will not be left overnight without prior approval.
- 8) All personnel shall not enter any other areas of the premises (except the areas agreed to) without prior approval of the Construction Administrator.

Security Regulations For County Correctional Facilities:

- A. Contractor's attention is called to the fact that this work is to be performed on property adjacent and/or within the County's Correctional Facilities; therefore, all personnel associated with this project are subject to special conditions affecting security and control of the Correctional Facility Operations. Every person required to enter the work site will be fingerprinted, processed for a photo ID card and be required to fill out appropriate applications. **There is a \$100.00 processing fee for each person**, checks made payable to the Commissioner of Finance. All ID processing will be scheduled by the Construction Administrator.
- B. All Contractors and Subcontractors shall issue a copy of the security regulations (Paragraph C) to all personnel to be engaged on this project.
- C. All Contractor's and Subcontractor's personnel shall be bound by the following security regulations for the duration of this project.
 - 1) All personnel entering the Penitentiary, Jail or Women's Unit must stop and identify themselves to the Control or Desk Officer who will issue the appropriate pass after ascertaining that they have been cleared to enter the facility. Only workers with valid ID will be permitted entry. **NO HELPERS.**
 - 2) All personnel must sign in the Visitor's Book, to include the following information: **PERSON'S NAME, COMPANY NAME, REASON FOR ENTRY, WORK LOCATION IN BUILDING.**
 - 3) All personnel must conspicuously display the ID card and identify themselves upon request.
 - 4) If ID card is misplaced or lost, report this loss immediately to the Shift Captain or Associate Warden.
 - 5) All tradesmen will be required to perform a tool inventory inspection of all tools in their possession to demonstrate to the admitting Correction Officer that the typed inventory list matches the tools each time they enter and leave the building. The tradesmen are responsible for keeping all tools and equipment locked when not in immediate use and

GENERAL REQUIREMENTS

they must report any loss of tools or equipment immediately to the Shift Captain or Associate Warden.

- 6) All tradesmen and helpers shall carry all tools in a locked and secured tool box or tool cart. A typed inventory sheet shall be carried with the tool box/cart listing all hand and power tools. A manufacturer's MSD Sheet shall be carried with the tool box/cart for any chemical compound that the tradesman has in his/her possession.
- 7) All debris (i.e. packaging, demolition, etc) shall be removed from the worksite at the end of each workday.
- 8) All personnel are subject to search at all times.
- 9) All personnel must observe all orders of Correctional Staff.
- 10) All personnel are to report any unusual incidents or problems to a Correction Officer, Shift Captain or the Associate Warden immediately.
- 11) All personnel shall not possess or consume any alcoholic beverage or illegal drug or medication while on County property, or report to work under the influence of alcohol or drugs.
- 12) Any vehicle left on County property must be locked and the ignition keys must be removed. Vehicles will not be left over-night on County property without prior approval.
- 13) All personnel shall not enter any other areas of the prison (except the areas agreed to) without prior approval of the Shift Captain or the Associate Warden.
- 14) All personnel shall not bring anything in for any inmate/detainee or staff member or take out anything for any inmate/detainee or staff member.
- 15) All personnel shall not engage in any unnecessary conversations with any inmate/detainee.
- 16) Weapons, i.e., guns, knives, blackjacks, to include any tool activated by gunpowder or other explosive charge is prohibited in the building (i.e., stud gun). Violators of this rule are subject to arrest.
- 17) All personnel must sign out when leaving and must return the ID card to the Control/Desk Officer before leaving.
- 18) Failure of the contractor to follow these procedures will result in the contractor being denied access to the facility.

5. PAYMENT FOR BONDS AND INSURANCE

The amount bid for contract bonds and insurance shall not exceed 3% of the total contract price excluding the bid price for Miscellaneous Additional Work (Item W800) and Field Testing Equipment (W851), where applicable. Should the bidder exceed the foregoing three percent (3%), the Department will make the necessary adjustment to determine the total amount bid based on the arithmetically correct proposal.

The amount bid shall be payable with the first contract payment.

GENERAL REQUIREMENTS

CONTRACT DRAWINGS:

CONTRACT NUMBER 22-510

The Design Drawings, as listed on the Contract Drawing Index, herewith made a part of these Specifications, shows in general and/or in detail the work to be done under this Contract and/or the various Contracts forming the entire work for the Project, as described herein.

After sending the executed contract to the County and prior to the first job meeting, the Contractor is responsible for obtaining from Public Works, Division of Engineering, Michaelian Office Building, White Plains, a maximum of five gratis copies of the Contract Drawings and Specifications; for the Contractor's permanent possession. Additional sets, requested by the Contractor, beyond the permitted number and time limit, will be furnished by Public Works; but at the Contractor's expense.

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G-003	Existing Site Plan	202-02-G-29-0	4
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M-002	Demolition Plans and Sections	202-02-M-55-0	30
M-003	Lower Level, Intermediate Level and Upper Level Plans	202-02-M-56-0	31
M-004	Sections	202-02-M-57-0	32
E-001	Symbols and Details	202-02-M-58-0	33
E-002	Demolition Site Plan	202-02-M-59-0	34
E-003	Site Plan	202-02-M-60-0	35
E-004	Demolition Plans	202-02-M-61-0	36
E-005	Lighting Plans	202-02-M-62-0	37
E-006	Power and Signal Plans	202-02-M-63-0	38
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H-001	General Notes, Symbols, Legends, Schedules, Airflow Diagram	202-02-M-72-0	47
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P-002	Demolition Plans	202-02-M-78-0	54
P-003	Lower, Intermediate and Upper Plan	202-02-M-79-0	55

Submit all proposal pages in this section, including all executed and unexecuted pages and fasten with a clip at the upper left hand corner.



George Latimer, Westchester County Executive

PROPOSAL PAGES

**Jackson Avenue Pumping Station Rehabilitation
Bronx Valley Sanitary Sewer District
Town of Greenburgh, New York**

Contract No. 22-510

Bid Opening: March 27, 2024

By Bidder (Please Print)

Firm/Business Name: _____

Address: _____

For Official Use Only

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

Division of Engineering

PROPOSAL REQUIREMENTS

BIDDER'S IDENTIFICATION

CONTRACT NO. _____

To the Commissioner of Public Works, Westchester County, New York, acting for the party of the first part.

Proposal made by _____
as party of the second part.

Whose business address is _____

Whose telephone number is _____

Whose E-mail address is _____

Whose Federal ID number is _____

Is bidder an individual,
a partnership or a corporation? _____

If a partnership or corporation,
give the names of all partners
or officers with their titles _____

If operating under a trade name or as partners, has the required Certificate been filed with a County Clerk in accordance with the General Business Law, Section 130?

Yes....[] No....[] N.A....[]

If the answer is NO, Certificate must be filed before the contract can be executed.

NOTE: the bid must be submitted using the Contractor's legal name, not just the "doing business as" (i.e. DBA) name.

COMPLETE THIS FORM USING BLACK INK ONLY

PROPOSAL REQUIREMENTS

1. The undersigned, the bidder, does hereby declare that it has carefully read the contract specifications and has carefully studied the relevant plans, profiles and other drawings (as defined in Article "Contract Drawings" of the General Requirements) relating to the contract work, and has inspected the site(s) of the work..
2. The undersigned does hereby declare that it is the only one interested in its indicated bid; that the bid is in all respects without fraud or reservations; and that no official of the County or of the participating municipalities (if any), or any person in the employ of the County of participating municipalities (if any) is directly interested in the contract bid or in the supplies, equipment or works to which it relates, or in any part of the profits resulting there-from.
3. The undersigned does hereby offer and agree to furnish all materials, to fully and faithfully construct, perform and execute all work under the contract in accordance with the plans, profiles, other drawings and specifications relating thereto, and to furnish all labor, tools, implements, machinery, forms, transportation and materials necessary and proper for said purpose at the following indicated lump sum price for the total work and/or the following indicated unit prices for the various items of the work.
4. The undersigned does hereby declare that the indicated price(s) cover all expenses of every kind incidental to the completion of the contract work, including all claims affecting the work, labor and materials, which may arise through any cause whatsoever, excepting as provided for in Article "Disputed Work-Notice Of Claims For Damages: of the General Clauses.
5. The undersigned hereby agrees that in the event that the quantities of contract work actually performed by the undersigned are less than the approximate quantities indicated in the specifications it will make no claim(s) for loss of anticipated profits.
6. The undersigned does hereby agree that it will execute a contract containing all the terms, conditions, provisions and covenants necessary to complete the work according to the appropriate plans and specifications, within ten working days after receipt by the undersigned of the contract from the County, and that if it fails to execute said contract within said period of time the County may rescind the contract award and may retain as liquidated damages and not as a penalty, any amounts submitted as the bid security accompanying the undersigned's proposal, and/or demand from the Bidder's Surety Company that executed the required Bid Bond and Consent of Surety to pay to the County the difference between the amount bid and the amount for which such contract is thereafter awarded, together with the cost to the County of reletting said contract up to the maximum aggregate amount of 25% of the amount bid.
7. The undersigned does hereby agree to commence the work encompassed under the contract within ten days after notification in writing from the Commissioner of Public Works or his authorized designee, unless a definite earlier or later start has been specified, and will complete the work fully and in every respect on or before the specified completion date; and further agrees that the County has the right to employ such combination of labor, equipment

PROPOSAL REQUIREMENTS

and materials as may be required for the proper completion of the contract work and to deduct all costs from such monies as may be due the undersigned, in the event the contract work is not completed by the specified completion date.

8. The undersigned does hereby agree to comply with all relevant provisions of the Labor Laws of the State of New York, and agrees to adhere to the provisions relating to the eight-hour day and five-day week, the payments of minimum rates for labor, and the latest laws relative to payments for wages for labor on public contracts.
9. The undersigned does hereby agree to insure all persons connected with the contract work against accident, at its own expense, as prescribed by the Workmen's Compensation Law of the State of New York; and that it will be responsible for payments by itself, its subcontractors and vendors of all taxes applicable to the work, and all other payments as may be required by various laws and rules and regulations of the Federal Government, the State of New York and its political subdivisions and agencies, such payments including but not limited to the following:
 - A. Federal Social Security Taxes on employees' wages.
 - B. Applicable Federal Excise Taxes.
 - C. New York State Unemployment Insurance and Disability Payments, based on employees' wages.
10. The undersigned does hereby agree to accept their indicated lump sum price for the total work and/or their indicated unit prices for the various items of the work as the sole basis in the determination of the value of addition to, or deletions from the specified scope of the contract work.

11. ADDENDUM RECEIPT - CONTRACT NO. _____

(The undersigned shall fill in contract number above, and the required information below.)

The undersigned does hereby acknowledge receipt of the below listed addenda to the contract specifications:

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

COMPLETE THIS FORM USING BLACK ONLY

PROPOSAL REQUIREMENTS

12. Bidders should not submit the entire Bid document with its bid submission. Instead, Bidders must submit ALL of the Proposal Pages. Proposal Pages are denoted by a border and are titled on the bottom as "Proposal Page ____".

Be sure that, where required, the forms have been completed and signed by a notary public.

Proposal Page 12 must be completed by a surety company and submitted with the bid if a Performance and Payment Bond is required in accordance with the "Notice to Contractors".

13. NON-COLLUSIVE BIDDING CERTIFICATION

Made pursuant to Section 103-d of the General Municipal Law of the State of New York as amended by the Laws of 1966.

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:
- 1) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
 - 2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
 - 3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.
- B. A bid shall not be considered for award nor shall any award be made where a. (1), (2) and (3), above, have not been complied with; provided however, that if any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where a. (1), (2) and (3), above, have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made, or his designee, determines that such disclosure was not added for the purpose of restricting competition."
14. The undersigned and each person signing in behalf of the undersigned hereby executes the foregoing Affirmative Action Questionnaire, Proposal, Addendum Receipt and Non-Collusive Bidding Certification.
15. The undersigned and each person signing on behalf of the undersigned hereby certifies that

PROPOSAL REQUIREMENTS

the person, firm or corporation submitting this proposal as the bidder has not been found guilty of a willful violation of the New York State Labor Law for failure to pay prevailing wages and supplements, as those terms are defined by the New York State Labor Law, within the twelve (12) months immediately preceding the submission of this bid.

16. The undersigned, by submitting the Proposal Pages, acknowledges that it has read the complete bid package including any and all addenda thereto and its bid includes all of the terms and conditions set forth in the bid documents, including, but not limited to, the Notice to Contractors, General Requirements and Proposals, Contract plans/drawings (if any), Proposal Forms, Information for Bidders, General Clauses, Sample Forms and Attachments, Sample Contract and Bond, Schedule of Hourly Rates and Supplements, Technical Specifications, any Special Notices and all applicable laws, rules and regulations. The undersigned further acknowledges that by submitting this bid the above denoted items are incorporated by reference and constitute an integral part of its bid.
17. The undersigned agrees that, if it is not the Successful bidder, the Sealed List of Subcontractors submitted with its bid can be destroyed by the County. **Please check the following box if you want the Sealed List of Subcontractors returned to you.** ☐

Dated _____, 20____

Legal Name of Person, Firm or
Corporation

(Seal of Corporation)

Business Address of Person, Firm or Corporation

By _____
Signature

Title

COMPLETE THIS FORM USING BLACK INK ONLY

LUMP SUM PROPOSAL

ITEM NO.	DESCRIPTION	AMOUNT BID	
		DOLLARS	CENTS
1	FEMA - Restoration Work: For providing all labor, material and equipment necessary to complete all Work to replace items damaged by Hurricane Ida as outlined in Section 01026 under Bid Item Description BI-1, Measurement and Payment and as shown on the Contract Drawings and Specifications.		
2	FEMA - Mitigation Work: For providing all labor, material and equipment necessary to complete all Work to provide future mitigation of flooding as outlined in Section 01026 under Bid Item Description BI-2, Measurement and Payment and as shown on the Contract Drawings and Specifications.		
3	Non - FEMA: For providing all labor, material and equipment necessary to complete all other Work as outlined in Section 01026 under Bid Item Description BI-3, Measurement and Payment and as shown on the Contract Drawings and Specifications.		
SUBTOTAL OF ALL ABOVE ITEMS:			
W699.020001	Mobilization (Must not exceed 2.00% of Subtotal Shown Above)		
W699.040002	Contract Bonds and Insurance (Must not exceed 3.00% of Subtotal Shown Above)		
W800	Necessary for Miscellaneous Additional Work per Article "Miscellaneous Additional Work (Item W-800)" of Information for Bidders, as directed.	\$700,000	.00
GROSS SUM OF TOTAL BID:			

CONTRACTOR: _____

ADDRESS: _____

BY: _____

Signature/Title

CONTRACTOR'S ACKNOWLEDGMENT

(If Corporate)

STATE OF NEW YORK)

COUNTY OF WESTCHESTER) ss.:

On this _____ day of _____, 20____, before me personally came _____
_____ to me known and known to me to be the _____
_____ of _____ the corporation described in and which
executed the within instrument, who being by me duly sworn did depose and say that he the said _____
_____ resides at _____
_____ and that he is _____ of said corporation and knows the corporate
seal of the said corporation; that the seal affixed to the within instrument is such corporate seal and
that it was so affixed by order of the Board of Directors of said corporation, and that he signed his
name thereto by like order.

Notary Public

CONTRACTOR'S ACKNOWLEDGMENT

(If Individual)

STATE OF NEW YORK)

COUNTY OF WESTCHESTER) ss.:

On this _____ day of _____, 20____, before me personally came _____
_____ to me known, and known to me to be the same person described in
and who executed the within instrument and he duly acknowledged to me that he executed the same
for the purpose herein mentioned and, if operating under the trade name, that the certificate required
by the New York State General Business Law Section 130 has been filed with the County Clerk of
Westchester County.

Notary Public

CONTRACTOR'S ACKNOWLEDGMENT

(If Co-Partnership)

STATE OF NEW YORK)

COUNTY OF WESTCHESTER) ss.:

On this _____ day of _____, 20____, before me personally came _____
_____ to me known, and known to me to be a member of the firm of _____
_____ and the person described in, and who executed the
within instrument in behalf of said firm, and he acknowledged to me that he executed the same in
behalf of, and as the act of said firm for the purposes herein mentioned and that the certificate
required by the New York State General Business Law Section 130 has been filed with the County
Clerk of Westchester County.

Notary Public

COMPLETE THIS FORM USING BLACK INK ONLY

CONTRACTOR'S ACKNOWLEDGMENT

(If Corporation/Sole Officer)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this _____ day of _____, 20__, before me
personally came _____ to me known and
(Name)

known to me to be the _____
(Title)

of _____, the corporation described in and which
(Name of Corporation)

executed the within instrument, who being by me duly sworn did depose and say that he/she,
resides at _____

and that he/she signed the within instrument, on behalf of said corporation, in his/her capacity
as the _____ and sole officer and director of said corporation
(Title)

and that he/she owns all the issued and outstanding capital stock of said corporation.

Notary Public

COMPLETE THIS FORM USING BLACK INK ONLY

LIMITED LIABILITY COMPANY ACKNOWLEDGMENT

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this _____ day of _____, 20__, before me

personally came _____ to me known to be the individual
(Name of individual who signed agreement)

who executed the foregoing instrument, and who, being duly sworn by me, did depose and say that

(s)he is (the)(a) _____ of _____,
 (member)(manager) (name of limited liability company)

a _____ limited liability company, and that (s)he has authority
(name of state)

to sign the same, and acknowledged that (s)he executed the same as the act and deed of said limited liability company.

Sworn to before me this ____ day
of _____, 20__

Notary Public

My Commission Expires on: _____

COMPLETE THIS FORM USING BLACK INK ONLY

CERTIFICATE OF AUTHORITY

I, _____
(Officer other than officer executing proposed documents)

certify that I am _____ of the
(Title)

(Name of Contractor)

(the "Contractor"), a corporation duly organized and in good standing under the

(Law under which organized, e.g., the New York Business Corporation Law)

named in the foregoing agreement; that _____
(Person executing proposal documents)

who signed said agreement on behalf of the Contractor was, at the time of execution the

_____ of the Contractor; that said agreement was
(Title of such person)

duly signed for and in behalf of said Contractor by authority of its Board of Directors, thereunto

duly organized, and that such authority is in full force and effect at the date hereof.

(Signature)

(SEAL)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this _____ day of _____, 20____, before me personally came
_____ to me known, and known to me to be
the _____ of _____, the
Corporation described in and which executed the above certificate, who being by me duly sworn did
depose and say that he, the said _____ resides at
_____ and that he is _____
_____ of said Corporation and knows the Corporate Seal of the said
Corporation; that the seal affixed to the above certificate is such Corporate Seal and that it was so
affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto
by like order.

Notary Public

COMPLETE THIS FORM IN BLACK INK ONLY

CERTIFICATE OF AUTHORITY-LIMITED LIABILITY COMPANY

I, _____,
(member or manager other than person executing the agreement)

certify that I am a _____ of _____
(member/manager) (Name of Limited Liability Company)

(the “LLC”) duly organized under the Laws of the State of _____; that
(Name of State)

_____ who signed said agreement on behalf of the LLC.
(Person Executing Agreement)

was, at the time of execution, a manager of the LLC; that said Contract was duly signed for and on behalf of said LLC and as the act of said LLC for the purposes herein mentioned.

(Signature)

[illegible]

On this _____ day of _____, 20____, before me personally came
_____, to me known, and known to me to be the _____
(name of member/manager) (member/manager)
described in and who executed the above certificate, who being be me duly sworn did depose and say
that he resides at _____, and he is a
(member/manager) of said LLC; that he is duly authorized to execute said certificate on behalf of said
LLC, and that he signed his name thereto pursuant to such authority.

Notary Public

County

My Commission Expires on: _____

COMPLETE THIS FORM USING BLACK INK ONLY

***Required for all Bids over \$100,000 where a Performance & Payment Bond
is Required in accordance with the "Notice to Contractors"***

CONTRACT NO. _____

BID BOND AND CONSENT OF SURETY

KNOW ALL PERSONS BY THESE PRESENTS, That _____
(Name of Contractor)

(Address)
(hereinafter called the "Principal") and the _____ a
corporation created and existing under the laws of the State of _____, having its principal office
at _____ (hereinafter called the "Surety"),
(PRINT FULL ADDRESS OF SURETY)

are held and firmly bound unto the County of Westchester (hereinafter called the "Obligee"), in the full just
sum of *Twenty-Five (25%) Percent of the Attached Bid*, good and lawful money of the United States of
America, for the payment of which said sum of money, well and truly to be made and done, the said
Principal binds themselves (himself/herself, itself), their (his/her, its) heirs, executors and administrators,
successors and assigns, and the said Surety binds itself, its successors and assigns jointly and severally,
firmly by these presents:

WHEREAS, the said Principal has submitted to the County of Westchester, New York, a
proposal/bid for Contract Number: _____
Project Title: _____ and

WHEREAS, under the terms of the Laws of the State of New York as above indicated, the said
Principal has filed or intends to file this bond to guarantee that the Principal will execute all required contract
documents, furnish all required insurance and furnish such Performance and Payment Bonds or other bonds
as may be required in accordance with the terms of the Principal's said proposal/bid.

NOW, THEREFORE, the Surety agrees:

(i) if the Contract for which the preceding estimate and proposal is made, is awarded to the Bidder by
the County, the Surety shall become bound as Surety and guarantor for the faithful performance of the
Contract and shall execute and deliver a Performance & Payment Bond, in a form acceptable to the County,
in the amount of 100% of the total Contract price, or such other amount as may be specified in the Bid
documents, and shall execute the Contract as party of the third part when required to do so by the Board of
Acquisition and Contract of the County; and

(ii) if the Bidder shall, upon award of the Contract to the Bidder, fail or refuse to execute the Contract
and furnish the necessary bonds and insurance certificates, the Surety shall, on demand by the County, pay to
the County the difference between the amount bid and the amount for which such contract is thereafter
awarded, together with the cost to the County of reletting said Contract, up to the maximum aggregate
amount of this bond.

(iii) the condition of the foregoing obligation is such, that if the said Principal shall promptly execute
and submit, and the County shall accept, all required contract documents including insurance and such
Performance and Payment Bond or other bonds, all as may be required in accordance with the terms of the
Principal's said bid/proposal, then this obligation shall be null and void, otherwise to remain in full force and
virtue.

The Surety, for value received, the receipt of which is hereby acknowledged by the Surety, hereby stipulates and agrees that the obligation of the Surety and of its bond shall remain absolute and shall be in no way impaired, affected or discharged by an extension of time, mutually agreed to by the County and the Bidder, within which the County may award said Contract, and the Surety hereby waives notice of any such extension.

IN TESTIMONY WHEREOF, the said Principal has hereunto set his/her (their, its) hand and the said Surety has caused this instrument to be signed by its duly authorized officer this _____ day of _____ 200__.

Signed and delivered this ____ day of _____ 20____ in the presence of:

(Print Name of Contractor)

(Signature) Principal

(Title of Authorized Officer)

(Print Name of Surety)

By _____ Surety
(Signature)

(Title of Authorized Officer)

(The Surety Company shall append a single copy of a statement of its financial condition, a copy of the resolution authorizing the execution of Bonds by officers of the Surety Company, Power of Attorney, Surety Acknowledgment.)

AFFIRMATIVE ACTION PROGRAM REQUIREMENT

Affirmative Action Program

An approved Affirmative Action Plan shall be required in all contracts for public work where the awarded contract amount exceeds \$50,000 or more than fourteen (14) persons are employed by the Contractor and/or his subcontractors.

Does the Contractor participate in an approved Affirmative Action Program? Yes [☐] No [☐]

If Yes, give name of Program: _____

If No, how many employees (total) does the Contractor employ. Please also include in your count the number of employees the Contractor and its Subcontractors expect to use on this project: _____

An approved Affirmative Action Program shall mean a plan approved or adopted by Westchester County including but not limited to, the Home-Town Plan, the Recruitment Training Program or any other program approved or meeting the requirements of the State or Federal government.

The "Monthly Employment Utilization Report" of the Sample Forms, shall be filled out by the Contractor and/or Subcontractor(s) who are required to have an Affirmative Action Program, prior to the start of the work.

Before any subcontractor is approved for use on this contract it will have to complete and submit the "Affirmative Action Program Requirement- Subcontractors" form of the Sample Forms.

COMPLETE THIS FORM USING BLACK INK ONLY

APPRENTICESHIP TRAINING PROGRAM REQUIREMENT

Apprenticeship Training Program

An approved Apprenticeship Training Program shall be required in all contracts for public work where the awarded contract amount exceeds \$50,000. and more than fourteen (14) persons are employed by the Contractor or Subcontractor(s).

Will the Contractor utilize apprentices for this
Contract? Yes [] No []

If Contractor Yes, do the apprentices participate in an approved Apprenticeship
Training Program? Yes [] No []

If Contractor Yes, give the name of the Program: _____

Will the Subcontractor(s) utilize apprentices for this
Contract? Yes [] No []

If Subcontractor(s) Yes, do the apprentices participate in an approved Apprenticeship
Training Program? Yes [] No []

If Subcontractor(s) Yes, give the name of the Program: _____

AN APPROVED APPRENTICESHIP TRAINING PROGRAM SHALL MEAN A NEW YORK
STATE REGISTERED APPRENTICESHIP TRAINING PROGRAM AS DEFINED UNDER
THE NEW YORK STATE LABOR LAW.

COMPLETE THIS FORM USING BLACK INK ONLY

CERTIFICATE OF LICENSE

(TO BE COMPLETED BY AN ELECTRICAL BIDDER ONLY)

_____, being duly sworn
(Name)

deposes and says that the following statements are true:

(1) I am the _____ of the
(Title)

_____, the bidder named on the
(Name of Contractor)

bid proposal, and I have read and am familiar with: a) the electrical license requirements contained in the Information for Bidders of the bid, b) Chapter 277 Article XVII of the Laws of Westchester County entitled Electrical Licensing Board and the Licensing of Master Electricians, and c) the Westchester County Electrical Licensing Board Rules and Regulations.

(2) I am familiar with, and this bid is being submitted in compliance with, the Westchester County Electrical Licensing Board Rules and Regulations, in particular No. 11, which states as follows:

No individual holding a Master Electrician's License shall lend such License to any person or allow any other person to carry on, engage in, or labor at the business as defined herein of installing, removing, altering, testing, replacing, or repairing electrical systems. A violation of this section by any person holding a License shall be sufficient cause for revocation of such License.

However, nothing herein shall be construed to prohibit the use of a License by the holder thereof for or on behalf of a partnership, corporation or other business association, provided that fifty-one (51) percent or more of the control of the voting capital stock of such partnership, corporation, or other business association is owned by one (1) or more holders of a Westchester County Master Electrical License and that all work performed by such partnership, corporation or other business association is performed by or under the direct supervision of such License holder or holders.

(3) That, as of this date, the bidder submitting the bid possesses the applicable valid Master/"Special" Electrician's license issued by the Westchester County Electrical Licensing Board; that this License is being used in compliance with the Laws of Westchester County and Westchester County Electrical Licensing Board Rules and Regulations; and **I have provided a copy of such license with the sealed bid proposal.**

COMPLETE THIS FORM USING BLACK INK ONLY

CERTIFICATE OF LICENSE (Continued)

(TO BE COMPLETED BY AN ELECTRICAL BIDDER ONLY)

(4) That all electrical work shall be performed in accordance with the requirements of Chapter 277 Article XVII of the Laws of Westchester County entitled Electrical Licensing Board and the Licensing of Master Electricians and the Westchester County Electrical Licensing Board Rules and Regulations.

(5) That I make this statement in connection with the submission of the bid as proof of the required electrical license, knowing that this statement will be relied upon by the County in the evaluation of that bid.

Signature

Sworn to before me
this _____ day of _____

License No.

Notary Public - State of New York

COMPLETE THIS FORM USING BLACK INK ONLY

CERTIFICATE OF LICENSE

(TO BE COMPLETED BY A PLUMBING BIDDER ONLY)

_____, being duly sworn
(Name)

deposes and says that the following statements are true:

(1) I am the _____ of the
(Title)

_____, the bidder named on the
(Name of Contractor)

bid proposal, and I have read and am familiar with: a) the plumbing license requirements contained in the Information for Bidders of the bid, b) Chapter 277 Article XV of the Laws of Westchester County entitled Westchester County Board of Plumbing Examiners and County-wide Plumbing License, and c) the Westchester County Board of Plumbing Examiners Rules and Regulations.

(2) I am familiar with, and this bid is being submitted in compliance with, Section 277.509A of Article XV of Chapter 277 of the Laws of Westchester County, which states as follows:

A. No holder of a license or certification issued under this article shall authorize, consent to or permit the use of his or her license or certification by or on behalf of any other person. No person who has not qualified or obtained a license or certification under this article shall represent himself or herself to the public as holder of a license or certification issued under this article, either directly, by means of signs, sign cards metal plates or stationery, or indirectly in any other manner whatsoever. However, nothing herein shall be construed to prohibit the use of a license by the holder thereof for or on behalf of a partnership, corporation or other business association, provided that 51 percent or more of the control of the voting capital stock of such partnership, corporation or other business association is owned by one or more holders of a Westchester County master plumbing license and that all work performed by such partnership, corporation or other business association is performed by or under the direct supervision of such license holder or holders.

(3) That, as of this date, the bidder submitting the bid possesses a valid Master Plumber's license issued by the Westchester County Board of Plumbing Examiners; that this License is being used in compliance with the Laws of Westchester County and the Westchester County Board of Plumbing Examiners Rules and Regulations; and **I have provided a copy of such license with the sealed bid proposal.**

COMPLETE THIS FORM USING BLACK INK ONLY

CERTIFICATE OF LICENSE (Continued)

(TO BE COMPLETED BY A PLUMBING BIDDER ONLY)

(4) That all plumbing work shall be performed in accordance with the requirements of Chapter 277, Article XV of the Laws of Westchester County entitled Westchester County Board of Plumbing Examiners and County-wide Plumbing License, and the Westchester County Board of Plumbing Examiners Rules and Regulations.

(5) That I make this statement in connection with the submission of the bid as proof of the required plumbing license, knowing that this statement will be relied upon by the County in the evaluation of that bid.

Signature

Sworn to before me
this _____ day of _____

License No.

Notary Public - State of New York

COMPLETE THIS FORM USING BLACK INK ONLY

CERTIFICATE OF LICENSE

(TO BE COMPLETED BY A HAULING BIDDER OR SUBCONTRACTOR ONLY)

_____, being duly sworn
(Name)

deposes and says that the following statements are true:

(1) I am the _____ of the
(Title)

_____, the bidder/subcontractor (circle one)
(Name of Contractor)

named on the foregoing bid proposal, and I have read and am familiar with the hauling license requirements contained in the Information for Bidders of the foregoing bid.

(2) That, as of this date, the bidder submitting the foregoing bid/subcontractor of the bidder submitting the foregoing bid (circle one) possesses a valid _____ license
(License type, i.e. Class "A")
issued by the Westchester County Solid Waste Commission.

(3) That all hauling work shall be performed in accordance with the requirements of Chapter 826-a of the Laws of Westchester County.

(4) That I make this statement in connection with the submission of the foregoing bid as proof of the required hauling license, knowing that this statement will be relied upon by the County in the evaluation of that bid.

Signature

Sworn to before me
this _____ day of _____

License No.

Notary Public - State of New York

COMPLETE THIS FORM USING BLACK INK ONLY

STORMWATER POLLUTION PREVENTION CERTIFICATION

I certify under penalty of law that I understand and agree to comply with the terms and conditions of the Stormwater Pollution Prevention Plan ("SPPP") for the construction site identified in such SPPP as a condition of authorization to discharge stormwater. I also understand the operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and it is unlawful for any person to contribute to a violation of water quality standards.

Signature

Sworn to before me

This _____ day of _____, 200__.

Notary Public – State of New York, County of _____

My Commission Expires on _____.

This Certification will also have to be signed by your subcontractors. Additional copies of this form can be acquired from the Department of Public Works.

COMPLETE THIS FORM USING BLACK INK ONLY

PREVAILING WAGE RATES AND SUPPLEMENTS

Compliance with the New York State Construction (Article 1, Section 17) and the New York State Labor Law (Section 220)

Is your firm in full compliance with the New York State Labor Law?
(Please check one)

Yes _____

No _____

Are the wage supplements paid into a Federally approved program?
(Please check one)

Yes _____

No _____

If Yes, please indicate which program:

If No, please indicate how the supplements are being paid:

Yes, I have read and understand the terms of this Contract and the laws of this Agreement:

Signature

Date: _____

Notary Public

Date: _____

COMPLETE THIS FORM USING BLACK INK ONLY

MINORITY/WOMEN BUSINESS ENTERPRISE PROGRAM QUESTIONNAIRE
QUESTIONNAIRE REGARDING BUSINESS ENTERPRISES
OWNED AND CONTROLLED BY WOMEN OR PERSONS OF COLOR

As part of the County's program to encourage the meaningful and significant participation of business enterprises owned and controlled by persons of color or women in County contracts, and in furtherance of Section 308.01 of the Laws of Westchester County, completion of this form is required.

A "business enterprise owned and controlled by women or persons of color" means a business enterprise, including a sole proprietorship, limited liability partnership, partnership, limited liability corporation, or corporation, that either:

- 1.) meets the following requirements:
 - a. is at least 51% owned by one or more persons of color or women;
 - b. is an enterprise in which such ownership by persons of color or women is real, substantial and continuing;
 - c. is an enterprise in which such ownership interest by persons of color or women has and exercises the authority to control and operate, independently, the day-to-day business decisions of the enterprise; and
 - d. is an enterprise authorized to do business in this state which is independently owned and operated.
- 2.) is a business enterprise certified as a minority business enterprise ("MBE") or women business enterprise ("WBE") pursuant to Article 15-a of the New York State Executive Law and the implementing regulations, 9 New York Code of Rules and Regulations subtitle N Part 540 et seq., **OR**
- 3.) is a business enterprise certified as a small disadvantaged business concern pursuant to the Small Business Act, 15 U.S.C. 631 et seq., and the relevant provisions of the Code of Federal Regulations as amended.

Please note that the term "persons of color," as used in this form, means a United States citizen or permanent resident alien who is and can demonstrate membership of one of the following groups:

- (a) Black persons having origins in any of the Black African racial groups;
- (b) Hispanic persons of Mexican, Puerto Rican, Dominican, Cuban, Central or South American descent of either Indian or Hispanic origin regardless of race;
- (c) Native American or Alaskan native persons having origins in any of the original peoples of North America; or
- (d) Asian or Pacific Islander persons having origins in any of the Far East countries, South East Asia, the Indian subcontinent or the Pacific Islands.

1. Are you a business enterprise owned and controlled by women or persons of color in accordance with the standards listed above?

_____ No

_____ Yes

Please note: If you answered “yes” based upon certification by New York State and/or the Federal government, official documentation of the certification must be attached.

2. If you answered “Yes” above, please check off below whether your business enterprise is owned and controlled by women, persons of color, or both.

_____ Women

_____ Persons of Color (*please check off below all that apply*)

_____ Black persons having origins in any of the Black African racial groups

_____ Hispanic persons of Mexican, Puerto Rican, Dominican, Cuban, Central or South American descent of either Indian or Hispanic origin regardless of race

_____ Native American or Alaskan native persons having origins in any of the original peoples of North America

_____ Asian or Pacific Islander persons having origins in any of the Far East countries, South East Asia, the Indian sub-continent or the Pacific Islands

Name of Business Enterprise: _____

Address: _____

Name and Title of person completing questionnaire: _____

Signature: _____

Notary Public

Date

CONTRACTOR'S DISCLOSURE STATEMENT

Instructions:

The County of Westchester, in order to insure that it employs responsible contractors for its major construction projects, requires all bidders for construction contracts (which includes reconstruction and repair) with an estimated value of One Hundred Thousand (\$100,000.00) or more Dollars to answer completely and swear to the questions below. If a Contractor Disclosure Statement has been included with this bid specification, then the County has determined that it is applicable to this bid. All subcontractors whose contract has a value of One Hundred Thousand (\$100,000.00) or more Dollars must also submit a Contractor Disclosure Statement.

Please read the questions carefully and answer them completely. Before you answer these questions, please read the definitions of terms used in these questions. While you may contact the Department of Public Works if you have questions about this form, the County cannot provide you with any legal advice for which you must contact your own lawyer. **FAILURE TO COMPLETE THIS CONTRACTOR DISCLOSURE STATEMENT IN GOOD FAITH MAY RESULT IN THE REJECTION OF YOUR BID.**

If you have previously filled out a Contractor Disclosure Statement for another County bid and only some but not all of your responses have changed, attach a copy of the prior Contractor Disclosure Statement and check #2 below indicating changes only and only answer those questions which have changed since you last filled out the Contractor Disclosure Statement.

If you have previously completed a Contractor Disclosure Statement for another County bid and nothing has changed in your responses to the questions, then check #3 and fill out the attached No Change Affidavit. Attach a copy of the prior Contractor Disclosure Statement to the No Change Affidavit.

NOTE IF THE SPACES PROVIDED FOR ANSWERS ARE NOT SUFFICIENT FOR YOU TO COMPLETE YOUR ANSWER TO A PARTICULAR QUESTION, THEN ATTACH ADDITIONAL PAGES TO THIS CONTRACTOR DISCLOSURE STATEMENT WHICH INDICATE THE NUMBER OF THE QUESTION THAT YOU ARE COMPLETING THE ANSWER FOR.

ALSO DO NOT LEAVE ANY ANSWERS BLANK. IF A QUESTION IS NOT APPLICABLE, ANSWER - N/A – AND OFFER A BRIEF EXPLANATION AS TO WHY THE QUESTION DOES NOT APPLY.

Definitions:

Affiliate – is another Business Entity in which the Contractor or one or more of the Principals of the Contractor has an ownership interest of more than fifty (50%) percent. An Affiliate is also another Business Entity in which the Parent of the Contractor owns more than fifty (50%) percent of that other Business Entity.

Agency or Government Agency – is any Federal, State, City or other local agency including, but not limited to, departments, offices, quasi-public agencies, public authorities and

CONTRACTOR'S DISCLOSURE STATEMENT

corporations, boards of education and higher education, public development corporations and local development corporations.

Assignee – is a person or Business Entity to whom an assignment (e.g., a transfer to another of any property, real or personal, including a transfer of any rights in such property) is made.

Business Address – is the location of principal executive offices and is also the primary place of business in Westchester County, if different.

Business Entity – is any profit-seeking business including, but not limited to, corporations, limited and general partnerships, joint ventures and individual (sole) proprietorships.

Contract – is any binding agreement with any Government Agency or other Business Entity for the provision of goods, or services including, but not limited to, construction.

Contractor – is the Business Entity submitting this Contractor Disclosure Statement.

Contractor Disclosure Statement – is this document.

Control – A Business Entity controls another Business Entity when:

- The controlling Business Entity owns more than fifty (50%) percent of the controlled Business Entity, or
- The controlling Business Entity directs or has the right to direct daily operations of the controlled Business Entity, or
- The same person is a Principal in both businesses and directs the daily operations of the controlled Business Entity.

Investigations – is any official inquiry by any Government Agency, with the exception of background investigations for employment.

Officer – is any individual who serves in the function of chief executive officer, chief financial officer or chief operating officer of the Business Entity by whatever titles known.

Parent – is a Business Entity which owns more than fifty (50%) percent of another Business Entity.

Principal – is an individual, partnership, joint venture or corporation which holds ten (10%) percent or more ownership interest in the Business Entity.

Partner – shall mean a person or Business Entity that has a joint ownership in a particular business, but the ownership interest is not as a shareholder of a corporation.

Successor – is a person or Business Entity that takes the place that another has left. With reference to a corporation, a successor shall mean another corporation which, through amalgamation, consolidation, or other legal succession, becomes invested with the rights and assumes the burdens of the first corporation.

CONTRACTOR'S DISCLOSURE STATEMENT

CONTRACT NO.: _____

☐ Check if Subcontractor

Type Of Submission

(Put a X or √ next to the applicable type of submission)

1. **Fully Completed Contractor Disclosure Statement** _____
(Sign Oath on last page of Disclosure Statement)

2. **Changes Only Contractor Disclosure Statement** _____
(Attach copy of previously filed Contractor Disclosure Statement that you are amending. Denote any changes on the following Contractor Disclosure Statement. Sign Oath on last page of this Disclosure Statement)

3. **No Change** _____
(Fill out "No Change Affidavit" [below] and attach copy of previously filed Contractor Disclosure Statement)

NO CHANGE AFFIDAVIT

I swear that the attached Contractor Disclosure Statement was submitted to the County of Westchester on _____ and was true as signed, and that
(Date)
since the above date nothing has occurred which changes in any way the responses made to the questions contained in the attached Contractor Disclosure Statement.

Submitted by: _____
(Signature)

Name (Print): _____

Title (Print): _____

Sworn to before me this ____ day of _____, 200__

NOTARY PUBLIC

COMPLETE THIS FORM USING BLACK INK ONLY

CONTRACTOR'S DISCLOSURE STATEMENT

Questions:

1. The Business Address and taxpayer identification number of Contractor and primary telephone number for such location.

2. List the Business Addresses and primary telephone numbers for such locations, if different from answer to #1 above, where Contractor has been located over the last five (5) years.

3. List all other names and taxpayer identification numbers under which the Contractor, or the Principals and Officers of Contractor, have conducted business within the prior five (5) years.

4. For any response to #3 above, list any and all Westchester County contracts that were awarded to such "other name" Business Entity.

5. List the type of Business Entity that the Contractor is presently organized as (for example - sole proprietorship, partnership, joint venture or corporation).

COMPLETE THIS FORM USING BLACK INK ONLY

CONTRACTOR'S DISCLOSURE STATEMENT

6. If Contractor is a corporation, list the date that the Contractor was incorporated. Also list the name of the Government Agency and location of said Agency in which a certificate of incorporation, certificate of doing business or equivalent, has been filed and the date of any amendments thereto. If, however, the Contractor is a partnership, list the date that the partnership was formed and the name of the Government Agency and location of said Agency in which a business certificate for partnership or equivalent has been filed.

7. List all the names, current Business Addresses and business telephone numbers of the Principals and Officers of the Contractor. If the Contractor is a partnership, list all partners and their business telephone numbers.

8. List the names, current Business Addresses, telephone numbers and taxpayer identification numbers of all Affiliates of the Contractor.

9. List all the names, Business Addresses and telephone numbers of the Principals and Officers of the Affiliates listed in response to #7 above. If the Affiliate is a partnership, list the Business Addresses and business telephone numbers of all partners.

COMPLETE THIS FORM USING BLACK INK ONLY

CONTRACTOR'S DISCLOSURE STATEMENT

10. Is the Contractor Controlled by another Business Entity? ____ Yes ____ No. If you answered yes, please identify the name, Business Address and telephone number of that Controlling Business Entity and list any contracts that the Controlling Business Entity has had with Westchester County in the past five (5) years?

11. If the Contractor has Control of any other Business Entity that has had a Contract with the County of Westchester in the past five (5) years, please identify the name, Business Address and telephone number of that Controlled Business Entity.

12. List any and all contract sanctions imposed on the Contractor or on a Business Entity listed in response to #3 above that was imposed by a Government Agency during the prior five (5) years, including, but not limited to, all cautions, suspensions, debarments, cancellations of a contract based on business conduct, declarations of default, determinations of ineligibility to bid or whether any proceedings to determine eligibility to bid are pending.

13. List the contract sanction history for the past five (5) years, as defined in #12 above, for any Affiliate of the Contractor.

COMPLETE THIS FORM USING BLACK INK ONLY

CONTRACTOR'S DISCLOSURE STATEMENT

14. If you answered yes to #10 above, list the contract sanction history as defined in #12 above for the Controlling Business Entity during the past five (5) years.

15. List any and all prevailing wage or supplement payment violations; state labor law violations deemed willful and any other federal or state citations, notices, violation orders, pending administrative hearings or proceedings or determinations of a violation of any labor law or regulation regarding the Contractor.

16. List all Investigations of the Contractor, its Principals and Officers or, if a partnership, of the Contractor's Partners. Also list all investigations of Affiliates, their Principals and Officers or, if a partnership, of their Partners.

COMPLETE THIS FORM USING BLACK INK ONLY

CONTRACTOR'S DISCLOSURE STATEMENT

17. Have all Federal and State income tax returns, if required, been filed by Contractor during the last five (5) years? ____Yes ____No If you answered no, please explain why such returns were not filed.

18. Are there any criminal proceedings pending against the Contractor or any Principal or Officer of the Contractor or partner, if Contractor is a partnership? ____Yes ____No If you answered yes, please provide details of the pending criminal proceedings.

19. List the record of all criminal convictions of the Contractor, any Principal or Officer or partner, if Contractor is a partnership, and of any former Principal or Officer, of the Contractor or former partner, if Contractor is a partnership, for any crime related to truthfulness or business conduct and for any felony committed within the prior ten (10) years.

20. List all bankruptcy proceedings that the Contractor or its Affiliates have been the subject of within the past seven (7) years, whether pending or completed.

COMPLETE THIS FORM USING BLACK INK ONLY

CONTRACTOR'S DISCLOSURE STATEMENT

21. Is the Contractor a successor, assignee or Affiliate of a Business Entity that has ever been denied a Contract or deemed ineligible to bid on a Government Agency contract?

____ Yes No ____ If you answered yes, explain below.

OATH

I swear that all of the above answers are true based on my knowledge of the facts, or are believed by me to be true, based upon a review of records containing the facts or based upon information I obtained from someone who has knowledge of the facts; and that I have authority to sign this document; and that the answers given above have not been made in a manner intended to deceive or to defeat the purpose of the Contractor Disclosure Statement, which is to assist the County of Westchester in determining if the Contractor is a responsible bidder.

Submitted by: _____
(Signature)

Name (Print): _____

Title (Print): _____

Sworn to before me this ____ day of
_____, 20__

NOTARY PUBLIC

COMPLETE THIS FORM USING BLACK INK ONLY

REQUIRED DISCLOSURE OF RELATIONSHIPS TO COUNTY

(Prior to execution of a contract by the County, a potential County contractor must complete, sign and return this form to the County)

Contract Name and/or ID No.:

(To be filled in by County)

Name of Contractor:

(To be filled in by Contractor)

A potential County contractor must complete this form as part of the proposed County contract.

- 1.) Are any of the employees that the Contractor will use to carry out this contract also a County officer or employee, or the spouse, child, or dependent of a County officer or employee?

Yes _____ No _____

If yes, please provide details (attach extra pages, if necessary): _____

- 2.) Are any of the owners of the Contractor or their spouses a County officer or employee?

Yes _____ No _____

If yes, please provide details (attach extra pages, if necessary): _____

- 3.) Do any County officers or employees have an **interest**¹ in the Contractor or in any approved subcontractor that will be used for this contract?

Yes _____ No _____

If yes, please provide details (attach extra pages, if necessary): _____

By signing below, I hereby certify that I am authorized to complete this form for the Contractor.

Name: _____

Title: _____

Date: _____

¹ "Interest" means a direct or indirect pecuniary or material benefit accruing to a County officer or employee, his/her spouse, child or dependent, whether as the result of a contract with the County or otherwise. For the purpose of this form, a County officer or employee shall be deemed to have an "interest" in the contract of:

- 1.) His/her spouse, children and dependents, except a contract of employment with the County;
- 2.) A firm, partnership or association of which such officer or employee is a member or employee;
- 3.) A corporation of which such officer or employee is an officer, director or employee; and
- 4.) A corporation of which more than five (5) percent of the outstanding capital stock is owned by any of the aforesaid parties.

QUESTIONNAIRE REGARDING BUSINESS ENTERPRISES
OWNED AND CONTROLLED BY
SERVICE-DISABLED VETERANS

The County believes it is a laudable goal to provide business opportunities to veterans who were disabled while serving our country, and wants to encourage the participation in County contracts of certified business enterprises owned and controlled by service-disabled veterans. As part of the County's program to encourage the participation of such business enterprises in County contracts, and in furtherance of Article 17-B of the New York State Executive Law, we request that you answer the questions listed below.

The term "Certified Service-Disabled Veteran-Owned Business" shall mean a business that is a certified service-disabled veteran-owned business enterprise under the New York State Service-Disabled Veteran-Owned Business Act (Article 17-B of the Executive Law).

1. Are you a business enterprise that is owned and controlled by a service-disabled veteran in accordance with the standards listed above?

_____ No
_____ Yes

2. Are you certified with the State of New York as a Certified Service-Disabled Veteran-Owned Business?

_____ No
_____ Yes

3. If you are certified with the State of New York as a Certified Service-Disabled Veteran-Owned Business, please attach a copy of the certification.

Name of Firm/Business Enterprise: _____

Address: _____

Name/Title of Person completing Questionnaire: _____

Signature: _____

STATE OF NEW YORK)
) ss.:
COUNTY OF)

Notary Public

Date:

SCHEDULE "F"
CRIMINAL BACKGROUND DISCLOSURE
INSTRUCTIONS

Pursuant to Executive Order 1-2008, the County is required to maintain a record of criminal background disclosure from all persons providing work or services in connection with any County contract, including leases of County-owned real property and licenses:

- a.) If any of the persons providing work or services to the County in relation to a County contract are not subject to constant monitoring by County staff while performing tasks and/or while such persons are present on County property pursuant to the County contract; and
- b.) If any of the persons providing work or services to the County in relation to a County contract may, in the course of providing those services, have access to sensitive data (for example SSNs and other personal/secure data); facilities (secure facilities and/or communication equipment); and/or vulnerable populations (for example, children, seniors, and the infirm).

In those situations, the persons who must provide a criminal background disclosure ("Persons Subject to Disclosure") include the following:

- a.) Consultants, Contractors, Licensees, Lessees of County-owned real property, their principals, agents, employees, volunteers or any other person acting on behalf of said Contractor, Consultant, Licensee, or Lessee who is at least sixteen (16) years old, including but not limited to Subconsultants, subcontractors, Sublessess, or Sublicensees who are providing services to the County, and
- b.) Any family member or other person, who is at least sixteen (16) years old, residing in the household of a County employee who lives in housing provided by the County located on County property.

Under Executive Order 1-2008, it is the duty of every County Consultant, Contractor, Licensee, or Lessee to inquire of each and every Person Subject to Disclosure and disclose whether they have been convicted of a crime or whether they are subject to pending criminal charges, and to submit this form with that information.¹ Accordingly, you are required to complete the attached Criminal Background Disclosure Form and Certification.

Please note that under no circumstances shall the existence of a language barrier serve as a basis for the waiver of or an exception from the disclosure requirements of Executive Order 1-2008. If translation services are required by the Consultant, Contractor, Licensee, or Lessee to fulfill this obligation, it shall be at the sole cost and expense of the Consultant, Contractor, Licensee, or Lessee.

Please also note that the conviction of a crime(s) and/or being subject to a pending criminal charge(s) will not automatically result in a denial of a person's right to work on a County contract, right to be on County property, or license, but may, if the County determines that the prior conviction(s) or pending criminal charge(s) create an unacceptable risk. However, if a person fails to list or falsifies any part of his/her conviction history or any pending criminal charge(s) for any reason, he/she may be prohibited from working or being on County property without any risk assessment. If it is later determined that a Person Subject to Disclosure failed to disclose a criminal conviction or pending criminal charge for any reason, his/her right to work on a County contract, be on County property, or license may be terminated at any time.

Please further note that, pursuant to Executive Order 1-2008, and subject to the applicable provisions of New York Correction Law §§ 752 and 753, the County has the right to bar a Person Subject to Disclosure from providing work or services to the County or from being on County property if any such person has:

- a.) A conviction of a crime(s);
- b.) A pending criminal proceeding for a crime(s); or
- c.) Refused to answer questions concerning his/her criminal background

¹ For these disclosures, a "crime" or "pending criminal charge" includes all felonies and misdemeanors as defined under the New York State Penal Law or the equivalent under Federal law or the laws of any other State.

Please finally note that any failure by a County Consultant, Contractor, Licensee, or Lessee to comply with the disclosure requirements of Executive Order 1–2008 may be considered by the County to be a material breach and shall be grounds for immediate termination by the County of the related County contract.

Exemptions

Executive Order 1-2008 exempts from the aforementioned disclosure requirements Persons Subject to Disclosure:

- a.) for whom the County has already conducted a background check and issued a security clearance that is in full force and effect; and
- b.) for whom another state or federal agency having appropriate jurisdiction has conducted a security and/or background clearance or has implemented other protocols or criteria for this purpose that apply to the subject matter of a County contract that is in full force and effect.

If you are claiming an exemption for one or more Persons Subject to Disclosure, you must notify the Procuring Officer². The Procuring Officer will then determine whether the Person(s) Subject to Disclosure are actually exempt, and provide written notification of his/her determination. If the Procuring Officer determines that a Person Subject to Disclosure is not exempt, the Procuring Officer will notify you of that determination, and you will have to include disclosures for that person on your Criminal Background Disclosure Form and Certification.

² Procuring Officer” shall mean the head of the department or the individual or individuals authorized by the head(s) of the department(s) undertaking the procurement and with respect to those matters delegated to the Bureau of Purchase and Supply pursuant to Section 161.11(a) of the Laws of Westchester County, the Purchasing Agent.

Subconsultants, Subcontractors, Sublessees, or Sublicensees

Under Executive Order 1-2008, it is your duty to ensure that any and all approved subconsultants, subcontractors, sublessees, or sublicensees complete and submit the attached Criminal Background Disclosure Form and Certification for all of their respective Persons Subject to Disclosure. This must be done before such a subconsultant, subcontractor, sublessees, or sublicensees can be approved to perform work on a contract.

New Persons Subject to Disclosure

Under Executive Order 1-2008, you have a **CONTINUING OBLIGATION** to maintain the accuracy of the Criminal Background Disclosure Form and Certification (and any accompanying documentation) for the duration of this contract, including any amendments or extensions thereto. Accordingly, it is your duty to complete and submit an updated Criminal Background Disclosure Form and Certification whenever there is a new Person Subject to Disclosure for this contract. **NO NEW PERSON SUBJECT TO DISCLOSURE SHALL PERFORM WORK OR SERVICES OR ENTER ONTO COUNTY PREMISES UNTIL THE UPDATED CRIMINAL BACKGROUND DISCLOSURE FORM AND CERTIFICATION IS FILED WITH THE PROCURING OFFICER.** You shall also provide the County with any other updates that may be necessary to comply with the disclosures required by Executive Order 1-2008.

PLEASE CONTINUE TO THE

Criminal Background Disclosure Form and Certification

BEGINNING ON THE NEXT PAGE

CONTRACT #: _____

Name of Consultant, Contractor, Lessee, or Licensee: _____

**CRIMINAL BACKGROUND DISCLOSURE
FORM AND CERTIFICATION**

If this form is being completed by a subconsultant, subcontractor, sublessee, or sublicensee, please consider all references in this form to "consultant, contractor, lessee, or licensee" to mean "subconsultant, subcontractor, sublessee, or sublicensee" and check here: _____

I, _____, certify that I am a principal or a
(Name of Person Signing Below)

representative of the Consultant, Contractor, Lessee, or Licensee and I am authorized to complete and execute this Criminal Background Disclosure Form and Certification. I certify that I have asked each Person Subject to Disclosure the following questions:

- **Have you or your company ever been convicted of a crime (all felonies and misdemeanors as defined under the New York State Penal Law or the equivalent under Federal law or the laws of any other State) including, but not limited to, conviction for commission of fraud, embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property?**
- **Are you or your company subject to any pending criminal charges (all felonies and misdemeanors as defined under the New York State Penal Law or the equivalent under Federal law or the laws of any other State)?**

I certify that the names and titles of Persons Subject to Disclosure who refused to answer **either** of the questions above are:

1. _____
2. _____
3. _____
4. _____
5. _____

(If more space is needed, please attach separate pages labeled "REFUSED to Answer - Continued.")

I certify that the names and titles of Persons Subject to Disclosure who answered “Yes” to **either of the** questions above are:

1. _____
2. _____
3. _____
4. _____
5. _____

(If more space is needed, please attach separate pages labeled “YES Answers - Continued.”)

Each Person Subject to Disclosure listed above who has either **been convicted of a crime(s)** and/or **is subject to a pending criminal charge(s)** must answer additional questions. Those questions are below.

A Person Subject to Disclosure who has **been convicted of a crime(s)** must respond to the following (please attach separate pages with responses for each person, with their name and title):

- 1.) Describe the reason for being on County property if applicable, identify the specific duties and responsibilities on this project which you intend to perform for the County, including but not limited to, access to sensitive data and facilities and access to vulnerable populations.
- 2.) Please list all criminal convictions along with a brief description of the crime(s) (including all felonies and misdemeanors as defined under the New York State Penal Law or the equivalent under Federal law or the laws of any other State).
- 3.) Please provide the date and place of each conviction.
- 4.) Please provide your age at the time of each crime for which you were convicted.
- 5.) Please provide the legal disposition of each case.
- 6.) Please provide any information either produced by yourself or someone on your behalf in regards to your rehabilitation and good conduct.

A Person Subject to Disclosure who **is subject to a pending criminal charge(s)** must respond to the following (please attach separate pages with responses for each person, with their name and title):

- 1.) Describe the reason for being on County property and if applicable, identify the specific duties and responsibilities on this project which you intend to perform for the County, including but not limited to, access to sensitive data and facilities and access to vulnerable populations.
- 2.) Please identify all pending criminal charges (all felonies and misdemeanors as defined under the New York State Penal Law or the equivalent under Federal law or the laws of any other State).
- 3.) Please briefly describe the nature of the pending charges and the date upon which it is alleged that a crime was committed.

I hereby certify that all of the information provided herein (and in any and all attachments) is true and accurate and that all disclosures required by Executive Order 1-2008 and this Criminal Background Disclosure Form and Certification have been completed. By my signature below, I hereby affirm that all of the facts, statements and answers contained herein (and in any and all attachments) are true and correct. I understand that providing false or incomplete information or withholding by omission or intention pertinent information will be cause for refusing further consideration of my being utilized under this contract.

It is understood and agreed that no Person Subject to Disclosure shall perform work or services or enter onto County property until this required Criminal Background Disclosure Form and Certification is filed with the Procuring Officer.

It is understood and agreed that to the extent that new Persons Subject to Disclosure are proposed to perform work or provide services under this contract after filing of this Criminal Background Disclosure Form and Certification with the Procuring Officer, such new Persons Subject to Disclosure shall not perform work or provide services or enter into County property until an updated Criminal Background Disclosure Form and Certification has been filed with the Procuring Officer.

It is further understood and agreed that the consultant, contractor, lessee, or licensee has a continuing obligation to maintain the accuracy of the Criminal Background Disclosure Form and Certification for the duration of this contract, including any amendments or extensions thereto, and shall provide any updates to the information to the County as necessary to comply with the requirements of Executive Order 1-2008.

Name: _____
Title: _____
Date: _____

Notary Public

Date

SUBCONTRACTOR'S SEALED BID SUBMISSION

Westchester County Contract No.: _____

Name of Subcontractor: _____

Address: _____

Phone #: _____ Fax #: _____

E-mail address: _____

Name of Contractor to whom
this bid is submitted: _____

Scope of Work to be performed by Subcontractor (e.g., electrical, plumbing, HVAC):

The price agreed upon by and between Contractor and Subcontractor for the full
performance of the Subcontractor's work:

\$: _____

In words (e.g, one hundred thousand dollars and xx/100):

Subcontractor

Contractor

Signature

Signature

By _____
(print name & title)

By _____
(print name & title)

**THE SUCCESSFUL LOW BIDDER, BEFORE AWARD OF THE CONTRACT, MUST
PROCURE AND PROVIDE TO THE COUNTY, FROM EACH OF THE ABOVE
DENOTED SUBCONTRACTORS, A CONTRACT DISCLOSURE STATEMENT
(PROPOSAL PAGES 24-32) AND THE REQUIRED DISCLOSURE OF
RELATIONSHIPS TO COUNTY (PROPOSAL PAGES 33-34)**

COMPLETE THIS FORM USING BLACK INK ONLY

INFORMATION FOR BIDDERS



2. INFORMATION FOR BIDDERS

DEPARTMENT OF PUBLIC WORKS

Division of Engineering

INFORMATION FOR BIDDERS

1. ADDENDA AND INTERPRETATION

No interpretation of the meaning of the plans, specifications or other contract documents will be made to any bidder orally. Every request for such interpretation should be in writing addressed to the Westchester County Department of Public Works, Division of Engineering, Room 512, Michaelian Office Building, White Plains, New York, and to be given consideration must be received at least five (5) days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be posted on the internet not later than three (3) days prior to the date fixed for the opening of bids. Revisions to plans or drawings requiring the issuance of additional or revised drawings will be noted on the internet with instructions how to acquire copies of such revised plans or drawings. Failure of any bidder to receive any such addendum or interpretation or any other form, instrument or document shall not relieve any bidder from any obligation under its bid as submitted. All addenda so issued shall become part of the contract documents.

A bidder's failure to request a clarification, interpretation, etc. of any portion of the plans, specifications, or contract or to point out any inconsistency therein will preclude such bidder from thereafter claiming any ambiguity, inconsistency, or error which should have been discovered by a reasonably prudent bidder and from asserting any claim for damages arising directly or indirectly therefrom.

2. VOIDED CLAUSES

Wherever in this booklet any page is stamped "VOID", only the section(s) or paragraph(s) so stamped are void. All other sections(s) and paragraph(s) remain in full force and effect.

3. PRE-BID SITE INSPECTION

Unless otherwise stated, on building construction work, bidders are free and encouraged to examine the work site during normal work hours preceding the date on which bids are to be opened. For those bidders requesting further clarification of the conditions, an appointment with the County's representative, on the eighth day (Tuesday) prior to the bid opening date, can be requested, by contacting the, Department of Public Works, Division of Engineering at (914) 995-2553.

Each bidder must inform itself fully of the conditions relating to the work to be performed. Failure to do so will not relieve a successful bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the contract documents and to complete the contemplated work for the consideration set forth in its Bid.

At the time of the opening of bids each bidder will be presumed to have inspected the sites and to have read and to be thoroughly familiar with the Plans and Contract Documents (including all addenda).

4. BID SECURITY

Bid Security shall be provided in accordance with the "Notice to Contractors." Where

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a Performance and Payment bond is required in the Notice to Contractors, the executed “Bid Bond and Consent of Surety” of the Proposal Pages must be submitted with the Bid when the bid is more than \$100,000. The successful bidder, no matter the size of its bid, will be required to furnish a Performance and Payment Bond.

Where a Performance and Payment Bond is not specified in the Notice to Contractors, then the required Security may be furnished in the form of a Certified Check; drawn to the order of “County of Westchester, clipped to the top of the front cover and submitted with the Bid.

Certified checks submitted will be returned to all bidders submitting certified checks within three (3) days after the opening of bids unless the bidder or bidders submitting certified checks are among the two lowest bidders. At any time after the opening of bids, the second lowest bidder, if the second lowest bidder has submitted a certified check, may substitute a bid bond for the certified check by presenting the bond to the Secretary of the Board of Acquisition and Contract. This bond shall be in the form and coverage required by the County and shall be in an amount not less than the amount of the bidder's certified check. After receipt, approval and acceptance of the bond by the County, the County will forward to the bidder a County check in an amount equal to the bidder's certified check.

All certified checks submitted will be returned to the two lowest bidders within 48 hours after the successful bidder executes the required contract and furnishes the County with all necessary bonds and insurance certificates.

In the event that the successful bidder has not executed the required contract and furnished the required bonds and insurance certificates within forty-five (45) days after the opening of bids, the County, upon demand from a bidder (except for the successful bidder), will send a County check to the bidder in the amount of the bidder's certified check.

Failure of the successful bidder to execute the contract and furnish the necessary bonds and insurance certificates shall result in forfeiture of the bid security, such sum to be retained by the County as liquidated damages.

5. PERFORMANCE AND PAYMENT BOND

If required pursuant to "Notice to Contractors."

If a Performance and Payment bond is required in accordance with the “Notice to Contractors”, the “Bid Bond and Consent of Surety” of the Proposal Pages must be executed by the Contractor’s Surety Company and submitted with the Bid for all bids over \$100,000.

Simultaneously with its delivery of the executed contract, the successful bidder shall deliver to the County an executed bond in the amount of one hundred percent of the accepted bid as security for the faithful performance of its contract and in the amount of one hundred percent for the payment of all persons performing labor or furnishing materials in connection therewith, prepared in satisfactory form and having as surety thereon such bond underwriter or surety that appears on the U.S. Treasury’s listing of approved sureties (Department Circular 570), and is licensed to transact business in New York State. In the event such Surety ceases to appear on the U.S. Treasury’s listing of approved sureties (Department Circular 570) or ceases to be licensed to transact business in New York State or becomes insolvent or enters liquidation proceedings, the Contractor, at its sole cost, shall furnish a replacement bond from a surety satisfactory to the County.

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The form of contract and Performance and Payment Bond to be used in connection with this Contract and to become a part of the contract documents is attached in the section entitled "Sample Contract and Bond for Construction".

6. INDEMNIFICATION AGREEMENT

The Contractor agrees:

- A. that except for the amount, if any, of damage contributed to, caused by or resulting from the negligence of the County, the Contractor agrees to indemnify and hold harmless the County of Westchester, its officers, employees, elected officials, and agents from and against any and all liability, damage, claims, demands, costs, judgments, fees, attorneys' fees or loss arising directly or indirectly out of the performance or failure to perform hereunder by the Contractor or third parties under the direction or control of the Contractor; and
- B. to provide defense for and defend, at its sole expense, any and all claims, demands or causes of action directly or indirectly arising out of the Agreement and to bear all other costs and expenses related thereto.

7. INSURANCE REQUIREMENTS

The Contractor, upon award of the contract and throughout the term of the Agreement, shall obtain at its own cost and expense the required insurance as delineated below from insurance companies licensed in the State of New York, carrying a Best's financial rating of A or better. Contractor shall provide evidence of such insurance to the County of Westchester ("County"), either by providing a copy of policies and/or certificates as may be required and approved by the Director of Risk Management of the County ("Director"). The policies or certificates thereof shall provide that ten (10) days prior to cancellation or material change in the policy, notices of same shall be given to the Board of Acquisition and Contract of the County of Westchester by registered mail, return receipt requested, for all of the following stated insurance policies, with a copy also sent to the Director of Risk Management of the County. All notices shall name the Contractor and identify the Contract Number.

If at any time any of the policies required herein shall be or become unsatisfactory to the Director, as to form or substance, or if a company issuing any such policy shall be or become unsatisfactory to the Director, the Contractor shall upon notice to that effect from the County, promptly obtain a new policy, and submit the policy or the certificate as requested by the Director to the Office of Risk Management of the County for approval by the Director. Upon failure of the Contractor to furnish, deliver and maintain such insurance, the Agreement, at the election of the County, may be declared suspended, discontinued or terminated.

Failure of the Contractor to take out, maintain, or the taking out or maintenance of any required insurance, shall not relieve the Contractor from any liability under the Agreement, nor shall the insurance requirements be construed to conflict with or otherwise limit the contractual obligations of the Contractor concerning indemnification.

All property losses shall be made payable to the "County of Westchester" and adjusted with the appropriate County personnel.

In the event that claims, for which the County may be liable, in excess of the insured amounts provided herein are filed by reason of Contractor's negligent acts or omissions under the

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agreement or by virtue of the provisions of the labor law or other statute or any other reason, the amount of excess of such claims or any portion thereof, may be withheld from payment due or to become due the Contractor until such time as the Contractor shall furnish such additional security covering such claims in form satisfactory to the Director.

In the event of any loss, if the Contractor maintains broader coverage and/or higher limits than the minimums identified herein, the County shall be entitled to the broader coverage and/or higher limits maintained by the Contractor. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the County.

The Contractor shall provide proof of the following coverage. (Other coverage may be required by the County of Westchester based on specific needs. If such other coverages are required for a specific contract, those coverages will be described in the "Special Clauses" of the contract specifications):

- a) Workers' Compensation and Employer's Liability. Certificate form C-105.2 or State Fund Insurance Company form U-26.3 is required for proof of compliance with the New York State Workers' Compensation Law. State Workers' Compensation Board form DB-120.1 is required for proof of compliance with the New York State Disability Benefits Law. Location of operation shall be "All locations in Westchester County, New York."

Where an applicant claims to not be required to carry either a Workers' Compensation Policy or Disability Benefits Policy, or both, the employer must complete NYS form CE-200, available to download at: <http://www.wcb.ny.gov>.

If the employer is self-insured for Workers' Compensation, he/she should present a certificate from the New York State Worker's Compensation Board evidencing that fact (Either SI-12, Certificate of Workers' Compensation Self-Insurance, or GSI-105.2, Certificate of Participation in Workers' Compensation Group Self-Insurance).

- b) Commercial General Liability Insurance with a combined single limit of \$1,000,000 (c.s.1) per occurrence and a \$2,000,000 aggregate limit naming the "County of Westchester" as an additional insured on a primary and non-contributory basis. This insurance shall include the following coverages:
 - i. Premises - Operations.
 - ii. Broad Form Contractual.
 - iii. Independent Contractor and Sub-Contractor.
 - iv. Products and Completed Operations.

NOTE: Additional insured status shall be provided by standard or other endorsement that extends coverage to the County of Westchester for both on-going and completed operations.

All Contracts involving the use of explosives, demolition and/or underground work shall provide proof that XCU is covered.

- c) Commercial Umbrella/Excess Insurance: \$2,000,000 each Occurrence and Aggregate naming the "County of Westchester" as additional insured, written on a "follow the form" basis.
- d) Owners Protective Liability Policy naming the County as insured, with a minimum limit of liability per occurrence of \$3,000,000 (where applicable, or as determined by the Director, Risk Management)
- e) Automobile Liability Insurance with a minimum limit of liability per occurrence of \$1,000,000 for bodily injury and a minimum limit of \$100,000 per occurrence for property damage or a

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combined single limit of \$1,000,000 unless otherwise indicated in the contract specifications. This insurance shall include for bodily injury and property damage the following coverages and name the "County of Westchester" as additional insured:

- i. Owned automobiles.
 - ii. Hired automobiles.
 - iii. Non-owned automobiles.
- f) Construction Insurance: For the construction, renovation or repair of bridges, viaducts or similar structures, the Contractor at its own cost and expense shall provide and maintain a "Bridge Builder's Risk Form, All Risk Insurance Contract," with flat premium endorsement, until the construction contract is accepted by the Board of Acquisition and Contract of the County of Westchester. The coverage shall be written for 100% of the completed value, covering the Contractor and County of Westchester as the insureds. The Contractor shall provide the original and duplicate policy to the County (unless the County shall accept, in lieu thereof, all contained endorsements including all applicable provisions and coverages).

For the construction of (a) new buildings and (b) for additions or repairs of existing buildings or structures, the Contractor at its own cost and expense shall provide and maintain a "Builder's Risk Form, All Risk Insurance Contract," with flat premium endorsement, until the construction contract is accepted by the Board of Acquisition and Contract of the County of Westchester. The coverage shall be written for 100% of the completed value, covering the Contractor and County of Westchester as the insureds. The Contractor shall provide the original and duplicate policy to the County (unless the County shall accept, in lieu thereof, all contained endorsements including all applicable provisions and coverages).

All policies of the Contractor shall be endorsed to contain the following clauses:

(a) Insurers shall have no right to recovery or subrogation against the County (including its employees and other agents and agencies), it being the intention of the parties that the insurance policies so effected shall protect both parties and be primary coverage for any and all losses covered by the above-described insurance.

(b) The clause "other insurance provisions" in a policy in which the County is named as an insured, shall not apply to the County.

(c) The insurance companies issuing the policy or policies shall have no recourse against the County (including its agents and agencies as aforesaid) for payment of any premiums or for assessments under any form of policy.

(d) Any and all deductibles in the above described insurance policies shall be assumed by and be for the account of, and at the sole risk of, the Contractor.

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8. PREVAILING WAGE RATES AND SUPPLEMENTS

A. Wages to be Paid and Supplements to be Provided

Each laborer, workman or mechanic employed by the Contractor(s), Sub-contractor(s) or other person(s) doing or contracting to do the whole or part of the work contemplated by this Contract, shall be paid the prevailing wages and provide the supplements (including but not limited to health, welfare and pension benefits) as required by Article 8 (Section 220-223) and Article 9 (230-239) of the New York State Labor Law.

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B. Schedule of Hourly Rates/Supplements

The "Schedule of Hourly Rates and Supplements" shows the prevailing hourly rates of wages to be paid and supplements to be provided. It is the County's preference that such supplements shall be paid to a Federally qualified Pension, Health and Welfare program and New York State Registered Apprentice Training Program.

Classifications not appearing on the rate sheet can be used only with the consent of the Commissioner of Public Works and then the rate to be paid will be given by the Commissioner of Public Works after advising with the State Department of Labor.

C. Grounds for Cancellation of Contract

In the event of a failure, to pay the prevailing wages and provide the supplements in accordance with the New York State Labor Law, and as described in this Contract, it shall be considered a material breach. For the breach or violation of this provision, without limiting any other rights or remedies to which the County or any individual may be entitled or any civil or criminal penalty for which any violator may be liable, the County shall have the right, in its discretion, to terminate this agreement immediately upon notice. In such event, the Contractor(s), Sub-Contractor(s), et al shall be liable to the County for any additional costs incurred by the County in the completion of the project.

In addition to any other remedies available to the County and irrespective of any applicable penalties pursuant to law, the County may deduct from the amount payable to the Contractor under this contract five hundred (\$500.00) dollars as reimbursement for the costs it incurs in investigating any violation of Section 220 of the Labor Law.

D. Records to be kept on Site

The Contractor(s), Sub-contractor(s), et al. shall certify their payrolls and keep them on site and available, in addition to the following informative records:

- 1) Record of hours worked by each workman, laborer and mechanic on each day;
- 2) Record of days worked each week by each workman, laborer and mechanic;
- 3) Schedule of occupation or occupations at which each workman, laborer and mechanic on the project is employed during each work day and week;
- 4) Schedule of hourly wage rates paid to each workman, laborer and mechanic for each occupation.
- 5) A statement or declaration signed by each workman, laborer and mechanic attesting that they have been provided with a written notice, informing them of the prevailing wage rates and supplements requirement for this contract.

E. Responsibility of the Contractor, Sub-Contractor, et al.

The Contractor(s), Sub-Contractor(s), et al. will display the posters in a conspicuous location at the site and distribute the wallet cards to the employees. These posters and wallet cards will inform the employees that they are entitled to receive the prevailing wages and supplements as determined by the Department of Labor and will list the

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Department of Labor's Public Work field offices, with phone numbers for individuals to call if they believe their rights are being violated.

F. Pay for a Legal Day's Work & Use of Apprentices

The wages to be paid for a legal day's work, as hereinbefore defined, to laborers, workmen or mechanics upon such public works, shall be not less than the prevailing rate of wages as hereinafter defined. Serving laborers, helpers, assistants and apprentices shall not be classified as common labor and shall be paid not less than the prevailing rate of wages as hereinafter defined. No employee shall be deemed to be an apprentice unless he is individually registered in an apprenticeship program which is duly registered with the Industrial Commissioner in conformity with the provision of Article 23 of the Labor Law. The wages to be paid for a legal day's work, as hereinbefore defined, to laborers, workmen or mechanics upon any material to be used upon or in connection therewith shall be not less than the prevailing rate for a day's work in the same trade or occupation in the locality within the state where such public work on, about or in connection with which such labor is performed in its final or completed form is to be situated, erected or used and shall be paid in cash; provided, however, that an employer may pay his employees by check upon a Certificate of the Industrial Commissioner to be issued only after a hearing upon the application to pay by check, which hearing shall be with notice of at least five days to be served personally or by mail on all interested persons, or if not served as aforesaid, then to be published in a manner directed by the Industrial Commissioner, which shall afford interested persons the opportunity to appear and to be heard at such hearing, and after proof has been furnished satisfactorily to the Industrial Commissioner of the employer's financial responsibility and the employer gives assurance that such checks may be cashed by employees without difficulty and for the full amount for which they are drawn. Such Contracts shall contain a provision that each laborer, workman or mechanic, employed by such Contractor, Subcontractor or other person about or upon such public works, shall be paid the wages herein provided.

G. Fiscal Officer's Duty to Determine Schedule of Wages

It shall be the duty of the fiscal officer (the "New York State Commissioner of Labor"), to ascertain and determine the schedule of wages to be paid workmen, laborers and mechanics on each such public work, prior to the time of the advertisement for bids, and such schedule of wages shall be annexed to and form a part of the specifications for the work. Such fiscal officer shall file with the department having jurisdiction such schedule of wages to the time of the commencement of the advertisement for bids on all public works proposed to be constructed. The term "Contract" as used in this subdivision also shall include reconstruction and repair of any such public work.

Where Contracts are not awarded within ninety days of the date of the establishment of the prevailing rate of wages by the fiscal officer, the department of jurisdiction shall request of the fiscal officer a redetermination of a schedule of wages.

H. Penalty for Payment of Less than Prevailing Wages

Any person or corporation that willfully pays after entering into such Contract, less than such stipulated wage scale as established by the fiscal officer shall be guilty of a

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misdemeanor and upon conviction shall be punished for such first offense by a fine of five hundred dollars or by imprisonment for not more than thirty days, or both fine and imprisonment; for a second offense by a fine of one thousand dollars, and in addition thereto the Contract on which the violation has occurred shall be forfeited and no such person or corporation shall be entitled to receive any sum nor shall any officer, agent, or employee of the state, municipal corporation or commission or board appointed pursuant to law pay the same or authorize its payment from the funds under his charge or control to any person or corporation for work done upon any Contract, on which the Contractor has been convicted for a second offense in violation of the provisions of this section.

9. LABOR AND COMPLIANCE WITH LABOR LAW

A. Preference for Westchester Residents

The Contractor agrees that in the performance of the work under this Contract he will give preference, and so far as legally possible, to employ citizens and residents of Westchester County.

B. Certifications To Be Filed

It is agreed that, in accordance with Section 220-d of the Labor Law as amended before final payment by or on behalf of the County for any sum due on account of a Contract for a public improvement, the Contractor and each and every Subcontractor of the Contractor or a Subcontractor is required to file a statement in writing in form satisfactory to the Commissioner of Finance certifying to the amounts then due and owing from such Contractor or Subcontractor filing such statement to or on behalf of any and all laborers for daily or weekly wages or supplements on account of labor performed upon the work under the Contract, setting forth therein the names of the persons whose wages or supplements are unpaid and the amount due to each or on behalf of each respectively, which statement so to be filed shall be verified by the oath of the Contractor or Subcontractor as the case may be that he has read such statement subscribed by him and knows the contents thereof, and that the same is true to his own knowledge.

C. Retention of Funds

It is further agreed that in accordance with Section 220b of the Labor Law, as amended:

- 1) In case any interested person shall have previously filed a protest in writing objecting to the payment to any Contractor or Subcontractor to the extent of the amount or amounts due or become due to him/her for daily or weekly wages or supplements for labor performed on the public improvement for which such Contract was entered into, or if for any other reason it may be deemed advisable, the Commissioner of Finance may deduct from the whole amount of any payment on account thereof the sum or sums admitted by any Contractor or Subcontractor in such statement or statements so filed to be due and owing by him on account of labor performed on such public improvement before making payment of the amount certified for payment in any estimate or voucher, and may withhold the amount so deducted for the benefit of the laborers, workmen or mechanics whose

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wages or supplements are unpaid or not provided, as the case may be, as shown by the verified statements filed by any Contractor or Subcontractor, and may pay directly to any person the amount or amounts shown to be due to him or his duly authorized collective bargaining labor organization, as the case may be, for such wages or supplements by the statements filed as hereinbefore required, thereby discharging the obligation of the Contractor or Subcontractor to the person or his duly authorized collective bargaining labor organization receiving such payment to the extent of the amount thereof, or

- 2) When any interested person shall file a written complaint with the fiscal officer as defined in section 220-b of the Labor Law, alleging unpaid wages or supplements due for labor performed on a public improvement for which a Contract has been entered into, and said labor is alleged to have been performed within the two year period immediately preceding the date of the filing of said complaint, or if, on the fiscal officer's own initiative, unpaid wages or supplements appear to be due, the fiscal officer shall immediately so notify the financial officer of the civil division interested, or, if there are insufficient moneys still due to the Contractor or Subcontractor to satisfy said wages and supplements, including interest and penalty, the financial officer of another civil division which has entered or subsequently enters into a public improvement contract with the Contractor or Subcontractor, who shall withhold from any payment due or earned by the Contractor or Subcontractor executing said public improvement, sufficient moneys to satisfy said wages and supplements, including interest at the rate provided herein, and any civil penalty that may be assessed as provided herein, pending a final determination. The Commissioner of Finance shall immediately confirm in writing to the fiscal officer the amount of money withheld.
- 3) Moneys withheld pursuant to this section shall be held by the Commissioner of Finance for the sole and exclusive benefit of the workers employed on said public improvement and for payment of any civil penalty that may be assessed as provided herein and shall not be used for any other purpose except upon court order. Any person, partnership, association, corporation or governmental body who files a lien or commences a judicial proceeding with respect to any moneys withheld pursuant to this section shall notify the fiscal officer in writing of the lien or claim on or before the date of filing of the lien or commencement of the judicial proceeding. In any proceeding to obtain moneys withheld pursuant to this section by any person, partnership, association, corporation or governmental body, the Commissioner of Labor shall have the right to appear and be heard.
- 4) The fiscal officer shall then cause an investigation to be made to determine whether any amounts are due to the laborers, workmen or mechanics, or on their respective behalves, on such public improvement, for labor performed after the commencement of the three-year period immediately preceding the filing of the complaint or the commencement of the investigation on his own initiative, as the case may be, and shall order a hearing therein at a time and place to be specified and shall give notice thereof, together with a copy of such complaint, or a statement of the facts disclosed upon such investigation, which notice shall be served personally or by mail on all interested persons, including the person complained

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against and upon the financial officer of the civil division; such person complained against shall have an opportunity to be heard in respect to the matters complained of, at the time and place specified in such notice, which time shall be not less than five days from the service of said notice. The fiscal officer in such an investigation shall be deemed to be acting in a judicial capacity and shall have the rights to issue subpoenas, administer oaths and examine witnesses. The enforcement of a subpoena issued under this section shall be regulated by the Civil Practice Law and Rules. Such investigation and hearing shall be expeditiously conducted, and upon such hearing and investigation, the fiscal officer shall determine the issues raised thereon and shall make and file an order in his office stating such determination and forthwith serve a copy of such order, either personally or by mail, together with notice of filing, upon the parties to such proceedings, and if the fiscal officer be the Comptroller, upon the Commissioner of the Department of Labor. Such order shall direct payment of wages or supplements found to be due, including interest at the rate of interest then in effect as prescribed by the Superintendent of Banks pursuant to Section fourteen (a) of the Banking law per annum from the date of the underpayment to the date of payment.

- 5) In addition to directing payment of wages or supplements, including interest found to be due, the order of the fiscal officer may direct payment of a further sum as a civil penalty in an amount not exceeding twenty-five percent of the total amount found to be due. In assessing the amount of the penalty, due consideration shall be given to the size of the employer's business, the good faith of the employer, the gravity of the violation, the history of previous violations of the employer or any successor or substantially-owned affiliated entity or any of the partners if the Contractor or Subcontractor is a partnership or any of the five largest shareholders of the Contractor or Subcontractor, as determined by the fiscal officer, and any officer of the Contractor or Subcontractor who knowingly participated in the violation of this article, and the failure to comply with record keeping or other non-wage requirements. Upon the fiscal officer's determination of the penalty, where the fiscal officer is the Commissioner of the Department of Labor, the penalty shall be paid to said Commissioner for deposit in the State Treasury.
- 6) Upon the entry and service of such order, the Commissioner of Finance shall pay to the claimant, from the moneys due to the Contractor or Subcontractor, the amount of the claim as determined by the fiscal officer and the amount of the civil penalty, if any, shall be paid as provided herein, provided that no proceeding pursuant to Article Seventy-Eight of the Civil Practice Law and Rules for review of said order is commenced by any party aggrieved thereby within thirty days from the date of said order was filed in the office of the fiscal officer. Said proceeding shall be directly in the appellate division of the Supreme Court. Where the fiscal officer is the Commissioner of the Department of Labor, the civil penalty shall be paid to said Commissioner for deposit in the State Treasury. In the event that such a proceeding for review is instituted, moneys sufficient to satisfy the claim and civil penalty shall be set aside by the Commissioner of Finance, subject to the order of the Court.

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- 7) When final determination has been made and such determination is in favor of the complainant, said complainant may in addition to any other remedy provided by this article, institute an action in any Court of appropriate jurisdiction against the person or corporation found violating this article, any substantially-owned affiliated entity or any successor of the Contractor or Subcontractor, any officer of the Contractor or Subcontractor who knowingly participated in the violation of this article, and any of the partners if the Contractor or Subcontractor is a partnership or any of the five largest shareholders of the Contractor or Subcontractor, as determined by the fiscal officer, for the recovery of the difference between the sum, if any, actually paid to him by the Commissioner of Finance pursuant to said order and the amount found to be due him as determined by said order. Such action must be commenced, within three years from the date of the filing of said order, or if the said order is reviewed in a proceeding pursuant to Article Seventy-eight of the Civil Practice Law and Rules, within three years after the termination of such review proceeding.
- 8) When two final determinations have been rendered against a Contractor, Subcontractor, successor, or any substantially owned affiliated entity of the Contractor or Subcontractor, any of the partners if the Contractor or Subcontractor is a partnership, any officer of the Contractor or Subcontractor who knowingly participated in the violation of this article, any of the five largest shareholders of the Contractor or Subcontractor or any successor within any consecutive six-year period determining that such Contractor, Subcontractor, successor, or any substantially-owned affiliated entity of the Contractor or Subcontractor, any of the partners or any of the five largest shareholders of the Contractor or Subcontractor, any officer of the Contractor or Subcontractor who knowingly participated in the violation of this article has willfully failed to pay the prevailing rate of wages or to provide supplements in accordance with this article, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public work projects are rendered simultaneously, such Contractor, Subcontractor, successor, or any substantially-owned affiliated entity of the Contractor or Subcontractor, any of the partners if the Contractor or Subcontractor is a partnership or any of the five largest shareholders of the Contractor or Subcontractor, any officer of the Contractor or Subcontractor who knowingly participated in the violation of this article shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with the State, any municipal corporation or public body for a period of five years from the second final determination, provided, however, that where any such final determination involves the falsification of payroll records or the kickback of wages or supplements, the Contractor, Subcontractor, successor, or any substantially-owned affiliated entity of the Contractor or Subcontractor, any partner if the Contractor or Subcontractor is a partnership or any of the five largest shareholders of the Contractor or Subcontractor, any officer of the Contractor or Subcontractor who knowingly participated in the violation of this article shall be ineligible to submit a bid on or be awarded any public work contract with the State, any municipal corporation or public body for a period of five years from the first final determination.

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- 9) Nothing in this subdivision shall be construed as affecting any provision of any other law or regulation relating to the awarding of public contracts.

Pursuant to Section 220-C of the Labor law, any Contractor or Subcontractor who shall upon his oath verify any statement required to be filed herein, which is known by him to be false, shall be guilty of perjury and punishable as provided by the Penal Law.

10. CONTRACTOR'S REPORT OF EMPLOYMENT AND WEEKLY AFFIDAVIT

Each week the Contractor shall furnish to the Commissioner of Public Works the "Contractor's Report Of Employment And Weekly Affidavit" of the Sample Forms.

11. LAWS/REGULATIONS AND APPROPRIATIONS

- A. The Contractor shall, at its own cost and expense, comply with all provisions of the Labor Law (i.e. prevailing rate of wages and supplements), Lien Law, Workmen's Compensation Law and all other laws and ordinances affecting this contract or order, either Federal, State or local.
- B. It is recognized and understood by the Parties that when this Agreement is subject to future appropriation by the Westchester County Board of Legislators for funds not presently appropriated to pay for this Agreement; the County shall have no liability under this agreement beyond the funds, if any, that are appropriated and available for payment of the amounts due under this Agreement. The Parties understand and intend that the obligation of the County to pay the amounts due hereunder shall constitute a current expense of the County and shall not in any way be construed to be a debt of the County in contravention of any applicable constitutional or statutory limitations or requirements concerning the creation of indebtedness by the County, nor shall anything contained in this Agreement constitute a pledge of the general tax revenues, funds or monies of the County. The County shall pay amounts due under this Agreement exclusively from legally available funds appropriated for this purpose. Notwithstanding the foregoing, the County will do all things lawfully within its power to obtain, maintain, and properly request and pursue funds from which payments under this Agreement may be made, including: (i) the County Executive making provisions for such payments to the extent necessary in the annual budget submitted to the Board of Legislators for the purpose of obtaining funding; and (ii) using its reasonable efforts to have such portion of the budget approved.

12. REFUSAL TO ANSWER QUESTIONS

It is understood and agreed by the Contractor that he/she bears an affirmative obligation to answer questions specifically or directly relating to this agreement before any official, board or agency authorized or empowered to inquire into such matters. This section shall not be construed as barring the Contractor, its directors, officers or employees from exercising their constitutional privilege against self-incrimination.

The foregoing, however, shall not be construed as limiting the rights and remedies of the County in the event of such refusal, and when such body or agency is wholly civil in nature,

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failure or refusal to fully cooperate with and diligently answer the inquiries of such official, board or agency may constitute grounds for the termination of this agreement and/or the exercise of any and all other rights or remedies which the County may have by reason of such failure or refusal.

Any and all contracts made with the State, the County of Westchester, or any public department, agency or official thereof, since July 1, 1959 by such person and by any firm, partnership or corporation of which he is a member, partner, director or officer, may be canceled or terminated by the County of Westchester, without incurring any penalty or damages on account of such cancellation or termination, but any monies owing pursuant to said transaction or contract prior to the cancellation and termination, shall be paid.

The successful bidder will be required to make all books and records concerning this contract available during business hours, upon reasonable notice, to duly authorized County personnel for the purpose of ascertaining compliance and/or performance of all provisions of this contract. This provision shall survive the termination of this agreement and for a period of six (6) years thereafter.

13. BID REQUIREMENTS

The Bid must be made on the "Proposal Pages" included in this specification or as provided with an addendum. All blank spaces on said Proposal Pages must be filled in and no change shall be made in the phraseology or in the items as contained therein.

Any bid which fails to name a price per unit of measurement for each of the items for which quantities are given, may be held to be informal and rejected. Bids submitted on Proposal Pages that contain any omissions, alterations, additions or items not called for in the bid documents, or that are illegible, unbalanced, conditional, incomplete or contain irregularities of any kind, may be rejected as informal. If the various parts of the work have been divided into classes and/or items to enable the bidder to bid for different portions of the work in accordance with its estimate of their costs, in the event of any increase or decrease in the quantity will be paid for at the price bid for that particular item. The sum of the amounts for each class or item, obtained by multiplying the approximate quantity by the unit price, shall constitute the total sum bid.

In the event of a discrepancy between the written bid amount and the numerical bid amount, the written amount will take precedence and be controlling as to the amount of the Bid. Any such discrepancy shall be corrected as set forth in Article "Correction Of Errors" of the Information for Bidders.

14. MISCELLANEOUS ADDITIONAL WORK (ITEM W-800)

A. Description - Under this item each Contractor shall furnish all labor, material and equipment required to accomplish miscellaneous additional work:

- 1) Necessitated by encountering during the course of the work field conditions of a nature not determinable during design; or
- 2) For which no unit prices are applicable.

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- B. Method of Measurement - Only that miscellaneous additional work shall be performed by the Contractor and will be paid for by the County, which has been authorized by the Commissioner or the Construction Administrator in writing, prior to its commencement.
- C. Article “Increase or Decrease of Quantities: Elimination of Items” of the Information for Bidders, will still apply relative to the percentage of the total awarded contract price that the work under the contract may be increased or decreased.
- D. Payment - The total amount paid to the Contractor will be determined in strict accordance with the provisions of Article “Extra Work: Increased Compensation/ Decreased Work: Credit to the Owner” of the General Clauses, and such payment will include only that overhead and profit that is applicable to the work performed under this item.
- E. Each Contractor shall include in its total bid the lump sum printed in the Proposal and any bid other than the specified amount will be considered informal.

15. CORRECTION OF ERRORS

Relative to dollar bid items and the required computations as submitted and performed by bidders on the proposal sheets, if there are any inconsistencies derived in multiplying unit bid prices by the stated quantities, the Commissioner reserves the right to reconcile the unit bid prices or the products of the unit bid prices and the stated quantities, when in the Commissioner's professional opinion such reconciliation(s) would concur with the apparent intent of a bidder and the Commissioner's estimated values of the respective bid items of the proposed contract work. In addition to the foregoing, the Commissioner reserves the right to correct all mathematical errors in additions or subtractions.

16. SHOWN QUANTITIES

All bids shall be submitted upon the following express conditions, which shall apply to and become a part of every bid received. The Bidders accept the quantities shown on the Proposal Pages opposite items of the work for which unit prices are to be bid as being approximate estimated quantities. Bidders shall satisfy themselves by personal examination of the location of the proposed work and surroundings thereof, and by such other means as they may prefer, as to the scope of the work and the accuracy of the approximate estimated quantities; and shall not at any time after submission of their bids dispute such approximate estimated quantities nor assert that there was any misrepresentation by the County or any misunderstanding by the Contractor in regard to the quantity or kind of materials to be furnished, or work to be done.

17. QUALIFICATION OF BIDDERS

The County may make such investigation as it deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish all information and data for this purpose as may be requested. The County reserves the right to reject any bid if the evidence submitted by, or the investigation of such bidder fails to satisfy the County, in the County's sole discretion, that it is properly qualified to carry out the obligations of the contract and to complete the contemplated work.

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18. REQUIRED EXPERIENCE

The County requires that each contractor possess not less than five (5) year's experience in performing work substantially similar in scope and size to the work for which it is bidding. The contractor agrees that upon request of the County the contractor will furnish a detailed statement of each project that it has performed during the most recent five (5) years (including but not limited to the name and address of the project, the name of the awarding entity/owner, the name of the awarding entity's/owner's representative, a current telephone number where that representative can be reached, the description of the project, general scope of the contractor's work, contract price, dates of performance, whether the contract was terminated for cause or convenience, whether the contract was completed and whether liquidated damages were assessed against the contractor [and if so, provide a written explanation]). The County reserves the right to require additional information as it deems appropriate concerning the history of the contractor's performance of each such contract. The final determination of whether the contractor possesses the requisite experience rests in the sole discretion of the County.

19. INCREASE OR DECREASE OF QUANTITIES: ELIMINATION OF ITEMS

In entering into this contract, the Contractor agrees that quantities shown on the Proposal Pages opposite items of the work for which unit prices have been requested are approximate estimated quantities, and that during the progress of the work the County may find it advisable and shall have the right to omit portions of the work, and to increase or decrease the shown approximate estimated quantities, or the scope of the whole work; and that the County reserves the right to add to or take from the total amount of the work up to a limit of thirty percent of the total amount of the contract based upon the executed contract price for all the specified work.

The Contractor shall make no claim for anticipated profits or loss of profits, because of any difference between the quantities of the various classes of work actually done, or of the materials actually furnished, and the original specified scope of work and the shown approximate estimated quantities.

The aforesaid thirty- percent pertains to the total amount of the contract and not to any individual item. Individual items may be increased or decreased any amount or may be eliminated entirely if so ordered by the Commissioner, excepting that the total amount of the contract as adjusted shall not result in a net increase or decrease of more than thirty percent except by mutual agreement between both parties thereto.

The Contractor waives all claims of any nature due to a misunderstanding of the location, character, or other conditions surrounding the work or of the shown approximate estimated quantities of items of the work.

20. BREAKDOWN COST OF LUMP SUM ITEMS AND CONTRACTS

After award of the contract and prior to actual start of the work, the successful bidder shall submit an itemized schedule of its estimated costs of lump sum items and or lump sum total contract work, for approval by the County. The schedule shall be submitted as an outline series with minor subdivisions, in accordance with the directives of the County. As part of

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this Schedule, the Contractor will be required to include a sum sufficient, as determined in the County's sole discretion, for the preparation and submission of approved final "As-builts", record drawings, guarantees, warranties, and operations and maintenance manuals.

21. ENGINEERING CHARGES

In addition to any and all other remedies available to the County when the work embraced in the contract is not completed on or before the date specified herein, engineering and inspection expenses incurred by the County of Westchester upon the work from the completion date originally fixed in the contract to the final date of completion of the work may be charged to the Contractor and be deducted from monies due the Contractor. Consideration of any extra work or supplemental contract work added to the original contract, as well as extenuating circumstances beyond the control of the Contractor, will be given due consideration by the County before assessing engineering and inspection charges against the Contractor. Such charges will be assessed, however, in cases where in the opinion of the Commissioner, the Contractor has delayed the work.

22. ESTIMATES AND PAYMENTS

As the work progresses but not more often than once a month and then on such days as the Construction Administrator may fix, the Contractor will submit a requisition in writing of the amount and value of the work performed and the materials and equipment provided to the date of the requisition, less any amount previously paid to the Contractor. The Contractor must complete at least ten (10%) percent of the work before submitting any claims for mobilization. From each requisition, the County will retain five percent (5%) plus one hundred fifty percent (150%) of the amount necessary to satisfy any claims, liens or judgments against the Contractor that have not been suitably discharged. The Commissioner will thereupon cause the balance of the requisition therein to be paid to the Contractor. In lieu of all or part of the cash retainage the County shall only accept bonds or notes of United States of America, New York State or political subdivisions thereof. As a condition to the making of any progress payment as set forth in this paragraph, the County, in its sole discretion may require the Contractor to submit such document as may be reasonably required to establish that the Contractor (and its subcontractor(s)) have timely and properly paid their respective subcontractor(s) and materialmen of whatever tier.

VENDOR DIRECT PAYMENT: All payments made by the County to the Contractor will be made by electronic funds transfer ("EFT") pursuant to the County's Vendor Direct program. The Contractor is required to complete the Vendor Direct Payment Authorization Form, which is located in the Forms Section on page 11 and 12. Payments will be automatically credited to the Contractor's designated bank account at the Contractor's financial institution. Payments are anticipated to be deposited two business days after the voucher/invoice is processed for payment. Saturdays, Sundays, and legal holidays are not considered business days. Under the Vendor Direct program you will receive an e-mail notification two days prior to the day the payment will be credited to your designated account. The e-mail notification will come in the form of a remittance advice with the same information that currently appears on County check stubs and will contain the date that the funds will be credited to your account. If there is a discrepancy in the amount received please contact

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your Westchester County representative as you would have in the past if there were a discrepancy in a check.

In the unlikely event that you do not receive the money in your designated bank account on the date indicated in the e-mail, please contact the Westchester County Accounts Payable Department at 914-995-3748. Whenever you change your bank or change or close your account a new Vendor Direct Payment Authorization Form must be submitted. Please contact the Westchester County Accounts Payable Department at 914-995-3748 and a new form will be e-mailed to you. When completing the payment authorization form you must either supply a voided check or have it signed by a bank official to ensure the authenticity of the account being set up to receive your payments. Failure to return the completed authorization form prior to award of the contract may result in the bid being considered non-responsive and the bid may be rejected.

When the work or major portion thereof, as contemplated by the terms of the contract (see Substantial Completion Payment and Final Payment later in this article), are substantially completed in the judgment of the Commissioner, the Contractor shall submit a requisition for the remainder of the contract balance. An amount equal to two (2) times the value of the remaining items to be completed plus one hundred fifty percent (150%) of the amount that the Commissioner deems necessary to satisfy any claims, liens or judgments against the Contractor which have not been suitably discharged shall be deducted from the requisition. As the remaining items of work are satisfactorily completed or corrected, the County will, upon receipt of a requisition, pay for these items less one hundred fifty percent (150%) of the amount necessary to satisfy any claims, liens or judgments.

Contractor agrees, in the event of any withdrawal by the contractor of amounts retained from payments to the contractor pursuant to the terms hereof, that notwithstanding any contrary interpretation of Section 106 of the New York General Municipal Law, the contractor will be obliged to maintain the market value of securities deposited in an amount equal to the amount withdrawn pursuant to said Section 106. The Contractor will, within five (5) days of demand therefore by the fiscal officer of the County, deposit with such fiscal officer cash, or securities of the kind provided in Section 106, of a market value sufficient to maintain the market value of all securities on deposit at a level equal (as of the date such notice of the fiscal officer is given to the contractor) to the amount which the County shall be entitled to retain from payments to the contractor pursuant to the terms of the contract.

All estimates will be made for actual quantities for work performed and materials and equipment incorporated in the work as determined by the measurements of the Engineer, and this determination shall be accepted as final, conclusive and binding upon the Contractor. All estimates will be subject to correction in any succeeding estimate.

Payment will be made for materials pertinent to the project which have been delivered to the site or off-site by the Contractor and/or Subcontractor and suitably stored and secured in first-class condition as required by the Construction Administrator. Payment may be limited to materials in short and/or critical supply and materials specially fabricated for the project, as defined by the contract. Payment will be made only upon the written request of the contractor. The Contractor must submit certified copies of the manufacturer's or vendor's invoices or statements establishing the true purchase value of the material or equipment; freight bills, release of liens and certificate of insurance covering all equipment and materials. Then the County will include in the following monthly payment an amount not to

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exceed the lesser of the bid breakdown or the total purchase price of the stored equipment and materials less retainage provided that such equipment and materials are suitable for their intended use.

The Contractor shall be responsible for safeguarding stored equipment and materials against loss or damage of any nature whatsoever, shall retain title until incorporated into the work and acceptance by the County and in case of loss or damage, the Contractor shall replace such lost or damaged equipment and materials at no cost to the County.

After receipt of payment, the Contractor shall not remove from the site equipment and materials for which such payment was made without written authorization from the Commissioner.

No major equipment item shall be brought to the site until the following conditions are met:

- 1) The County must have received the manufacture's recommendations for on-site storage in writing.
- 2) The structure in which the equipment is to be installed is roofed (roofing must be watertight) and has such protection of doorways, windows, and other openings that will provide reasonable protection from the weather.
- 3) Prior to the County making a Partial Payment on a major equipment item the following conditions must be met:
 - a. The Contractor must certify to the County, in writing, that the equipment has been properly stored.
 - b. The Shop Drawings must be approved and the draft Operation and Maintenance Manuals must have been submitted.

The Contractor shall furnish to the Construction Administrator, prior to the making up of any Partial or Final Estimate, a copy of its and its Subcontractors' weekly payrolls for each and every preceding payroll period. The payroll submitted shall be a certified true copy and shall contain full information including but not limited to the number of hours worked, rate, classification and total sum paid each employee charged to or working on the job. With all except the first estimate, the Contractor shall furnish to the Construction Administrator a sworn statement listing all unpaid bills and liabilities incurred under the Contract.

A. Substantial Completion Payment

- 1) Within thirty (30) days after receiving written notice from the Contractor of substantial completion of the work under this Agreement, the Commissioner will cause an inspection to be made of the work done under this contract. If, upon such inspection, the Engineer determines that the work is substantially complete, a Substantial Completion Payment to the Contractor for the work done under this Contract, less any and all deductions authorized to be made by the Commissioner under this contract or by law, will be issued.
- 2) Such a Payment shall be considered a Partial and not a Final Payment.
- 3) As a condition precedent to receiving payment therefore, the Contractor must have received County approval of all Shop Drawing submittals, the Operation and Maintenance Manuals, and As-Built Drawing(s). Together with its application for substantial completion payment the Contractor shall also deliver to the

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Construction Administrator a verified statement certifying that all claims or liabilities arising from the completed work, including all charges for Extra Work, Change Orders, additional time, damages or credits (collectively referred to as "claims") have been presented to the County. All such claims shall be described in sufficient detail so as to be easily identified. The Contractor's failure to submit the verified statement shall constitute a full and final waiver of all claims against the County from the beginning of the project through the date of substantial completion as established by the County. The presentation of the verified statement to the County shall not constitute an acknowledgement by the County that any such claim is valid. The County expressly reserves its right to assert that any such claim(s) is waived or precluded by reason of other provisions of the contract documents. Only claims particularly identified on the Contractor's verified statement shall be preserved; all other claims whatever nature shall be deemed waived and released. It shall also submit proof of title of the materials and equipment covered by the contract. The Contractor shall also, prior to the issuance of said Substantial Completion Payment, supply to the County affidavits and certificates for labor, material and equipment (where applicable).

B. Final Payment

- 1) Within ten (10) days after receiving written notice from the Contractor of completion of all the work, the Engineer will make a final inspection. If upon inspection the Engineer determines that no further work is needed, the Commissioner will request that the Board of Acquisition and Contract approve the completion of the project and authorize payment of the Final Estimate. Also required prior to the Board of Acquisition and Contract approval is a Condition Report by the Contractor that any damage of public or privately owned properties resulting from the Contractor's work has been satisfactorily repaired.
- 2) As a condition precedent to receiving Final Payment therefore the Contractor shall submit a supplementary verified statement similar to that required under, "A. Substantial Completion Payment", hereof. This verified statement must include only those charges for Extra Work, Change Orders, additional time, damages or credits (collectively referred to as "claims") that accrued between substantial completion and final completion. The Contractor's failure to submit the verified statement shall constitute a full and final waiver of all claims against the County from the beginning of the project through the date of substantial completion as established by the County. The presentation of the verified statement to the County shall not constitute an acknowledgement by the County that any such claim is valid. The County expressly reserves its right to assert that any such claim is waived or precluded by reason of other provisions of the contract documents. Only claims particularly identified on the Contractor's supplementary verified statement shall be preserved; all other claims of whatever nature shall be deemed waived and released.
- 3) The Contractor shall also, prior to the issuance of Final Payment, supply to the County affidavits and certificates for labor, material and equipment (where applicable).

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- 4) The County will, not less than thirty (30) days after the Final Acceptance of the work under this contract, by the Board of Acquisition and Contract, pay the Contractor upon the receipt of all required documentation the balance of funds due thereunder after deduction of all previous payments, liens and all percentages and amounts to be kept and retained under provision of this contract.

All prior Partial Payments, being merely estimates made to enable the Contractor to prosecute the work more advantageously, shall be subject to correction in the Final Estimate and Payment

- 5) The acceptance by the Contractor or by anyone claiming by or through him of the Final Payment shall operate as and shall be a release to the County and every officer and agent thereof, from any and all claims of the Contractor for anything done or furnished in connection with this work or project and for any act or omission of the County or of any others relating to or affecting the work. No payment, however, final or otherwise, shall operate to release the Contractor or its Sureties from any obligation under this contract or the Performance and Payment Bond. Should the Contractor refuse to accept the final payment as tendered by the County, it shall constitute a waiver of any rights to interest thereon. Nor shall refusal to accept final payment extend any applicable statute of limitation.

23. PAYMENTS TO SUBCONTRACTORS AND MATERIALMEN BY CONTRACTOR

Within fifteen calendar days of the receipt of any payment from the County, the contractor shall pay each of its sub-contractors and materialmen the proceeds from the payment representing the value of the work performed and/or materials furnished by the subcontractor and/or materialmen as reflected in the payment from the owner less an amount necessary to satisfy any claims, liens or judgment against the subcontractor or materialman which have not been suitably discharged and less any retained amount as hereafter described. The contractor shall retain not more than five per centum of each payment to the subcontractor and/or materialman except that the contractor may retain in excess of five per centum but not more than ten per centum of each payment to the subcontractor provided that prior to entering into a subcontract with the contractor, the sub-contractor is unable or unwilling to provide a performance bond and a labor and material bond both in the full amount of the sub-contract at the request of the contractor. However, the contractor shall retain nothing from those payments representing proceeds owed the subcontractor and/or materialman from the County's payments to the contractor for the remaining amounts of the contract balance as provided in Article "Estimates and Payments" of the Information For Bidders. Within fifteen calendar days of the receipts of payment from the contractor, the subcontractor and/or materialman shall pay each of its subcontractors and materialmen in the same manner as the contractor has paid the subcontractor.

Nothing provided herein shall create any obligation on the part of the County to pay or to see the payment of any moneys to any subcontractor or materialman from any contractor nor shall anything provided herein serve to create any relationship in contract or otherwise, implied or expressed between the subcontractor or materialman and the County. Notwithstanding anything to the foregoing, the County may tender payments to the Contractor in the form of joint or dual payee checks.

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NOTICE: No direct payment will be made for work done or materials furnished under the General Clauses, Information for Bidders, General Clauses and Special Clauses, except where expressly stated elsewhere, but compensation shall be deemed to be included in the contract lump sum price for the total work and/or the contract unit prices for the various items of the work.

24. TIME OF STARTING

Time being of the essence, all bidders shall take notice that the timely completion of the work called for under this contract is of the greatest importance. The contractor shall commence its work within ten (10) days after "notice to proceed" has been given it by the Commissioner (unless a definite starting date is stated). Prior to commencing its work, the Contractor shall notify the Director of Project Management, Division of Engineering and Department of Public Works, at least forty-eight (48) hours prior to the planned date of its "start", so that a Construction Administrator can be assigned to the work.

25. SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION AND DEMOLITION WORK

At all times the Contractor shall use all required and necessary precautions for the safety and protection of the public, County personnel, construction employees, and private and public property on or adjacent to the work.

The Contractor shall comply fully with all the applicable provisions of the following listed governmental regulations and standards, noting that in case of conflict, the Contractor shall comply with the most stringent rule or regulation:

- 1) State of New York, Department of Labor, Bureau of Standards and Appeals, Industrial Code Rule 23 "Protection of Persons Employed in Construction and Demolition Work."
- 2) United States Department of Labor, Bureau of Labor Standards, "Safety and Health Regulations for Construction," as promulgated in accordance with the Occupational Safety and Health Act of 1970, Public Law 91-596; 84 Stat. 1590, Laws of 91st Congress - 2nd Session.

It shall be the sole responsibility of the Contractor to ascertain which of the regulations and standards contained in the foregoing listed publications effect its construction activities, and it shall be solely responsible for the penalties resulting from its failure to comply with such applicable rules and regulations. Copies of the listed publications are available for reference purposes only, in the Westchester County Department of Public Works, Division of Engineering, Design Section, Room 500, Michaelian Office Building, White Plains, New York.

The West Nile Mosquito control program:

- 1) Routinely, the work site should be inspected for potential habitats (i.e. stagnant/standing water) for mosquitoes.
- 2) Conditions that would require remediation include: improper site grading, ruts/other depressions, water in debris (i.e. containers, tires, etc.), stored or

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discarded materials, and excavations, and those cited by the Construction Administrator.

- 3) Under the direction of the Construction Administrator, the Contractor shall take all necessary preventive and/or corrective action to eliminate the potential breeding grounds.

26. ACCIDENT PREVENTION AND FIRST AID FACILITIES

In addition to conforming to the applicable governmental regulations and standards referred to in Article "Fire Prevention And Control" of the Information For Bidders, the Contractor shall conduct its work in accordance with the recommendations contained in the latest edition of the "Manual of Accident Prevention in Construction," as published by the Associated General Contractors of America, Inc. and the most recent safety codes approved by the American Standards Association. In case of the conflict with the referenced governmental regulations and standards, the most stringent regulation, standard or recommendation shall govern.

Further, and without in any way limiting the Contractor's obligations hereunder, and in accordance with the instructions of the Construction Administrator, the Contractor shall provide barricades, warning lights, danger and caution signs and other safeguards at all places where the work in any way is a hazard to the public.

The Contractor shall also provide and maintain upon the site at each location where major work is in progress, a completely equipped first aid kit that shall be readily accessible when construction activities are in progress. Posted on each first aid kit shall be the name, location and telephone number of the nearest hospital or doctor with whom the Contractor has previously made arrangements for emergency treatment in case of accident.

27. FIRE PREVENTION AND CONTROL

The Contractor shall abide by such rules and instructions as to fire prevention and control as the municipality having jurisdiction may prescribe. It shall take all necessary steps to prevent its employees from setting fires not required in the construction of the facility and shall be responsible for preventing the escape of fires set in connection with the construction.

It shall at all times provide the proper housekeeping to minimize potential fire hazards, and shall provide approved spark arresters on all steam engines, internal combustion engines and fuels.

Free access to fire hydrants and standpipe connections shall be maintained at all times during construction operations, and portable fire extinguishers shall be provided by the Contractor and made conveniently available throughout the construction site. The Contractor shall also notify its employees of the location of the nearest fire alarm box at all locations where work is in progress.

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28. STATE AND LOCAL SALES TAX EXEMPTION

The Contractor's attention is directed to Section 1115 of the Tax Law of New York State, Chapters 513 and 514 of the Laws of 1974. In connection with capital improvement contracts entered into on or after September 1, 1974, all tangible personal property which will become an integral component of a structure, building or real property of New York State, or any of its political sub-divisions, including the County of Westchester, is exempt from State and local retail sales tax and compensating use tax.

Bidders' proposals shall exclude dollar amounts for the payment of State and Local retail sales tax and compensating use tax, for tangible personal property defined above.

The successful bidder shall be obliged to file the required Contractor Exempt Purchase Certificates, which may be obtained from the New York State Department of Taxation and Finance (1-800-462-8100), in order to utilize such exemption.

29. APPRENTICES

The attention of all bidders is directed to Section 220(3-e) of the New York State Labor Law, which is hereby incorporated herein by reference, which requires, among other things, that "Apprentices who are registered under a Bona Fide New York State Registered Apprentice Training Program shall be permitted to work."

30. AFFIRMATIVE ACTION PROVISION

During the performance of this Contract, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age or handicap. Contractor shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, national origin, age or handicap. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoffs or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor agrees to include, or require the inclusion of the above provision in any subcontract made pursuant to its contract with the County.

31. AFFIRMATIVE ACTION PROGRAM REQUIREMENT

Relative to the award of this Contract, it is required that all bidders completely answer all questions contained in the questionnaire entitled "Affirmative Action Program Requirement" of the Proposal Pages, and properly attest to same.

It is also required that all subcontractors completely answer all questions contained in the questionnaire entitled "Affirmative Action Program Requirement-Subcontractors" of the Sample Forms, and properly attest to same. This form is to be submitted with the request to utilize subcontractor(s).

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32. AUTHORITY TO DO BUSINESS IN NEW YORK

Any corporation not incorporated under the Laws of New York State, must furnish a copy of its certificate of authority, from the New York State Secretary of State, to do business in the State of New York, in accordance with Article 13 of the New York State Business Corporation Law.

33. LICENSE REQUIREMENTS (ELECTRICAL)

- A. In accordance with the requirements of Local Law No. 20-1997 of Westchester County, no person shall perform work under any contract with the County of Westchester except (i) a licensed Master Electrician; (ii) a licensed "Special Electrician"; or (iii) a Journeyman Electrician working under the direct supervision and control of a Master Electrician.

In no event shall the County incur any liability to pay for any electrical work performed in violation of the licensing requirements of Local Law No. 20-1997 of Westchester County.

- B. Contract with separate bids:

If the project is one where separate bid specifications are required pursuant to the provisions of the New York General Municipal Law, then any person, partnership, corporation, business organization or other business entity submitting a bid for the electrical portion of the project must possess, at the time of submission of the Bid, a valid Master/"Special" Electrician's license issued by the Westchester County Electrical Licensing Board in accordance with Chapter 277 Article XVII of the Laws of Westchester County and the Westchester County Electrical Licensing Board Rules & Regulations, in particular No. 11, which states as follows:

No individual holding a Master Electrician's License shall lend such License to any person or allow any other person to carry on, engage in, or labor at the business as defined herein of installing, removing, altering, testing, replacing, or repairing electrical systems. A violation of this section by any person holding a License shall be sufficient cause for revocation of such License.

However, nothing herein shall be construed to prohibit the use of a License by the holder thereof for or on behalf of a partnership, corporation or other business association, provided that fifty-one (51) percent or more of the control of the voting capital stock of such partnership, corporation, or other business association is owned by one (1) or more holders of a Westchester County Master Electrical License and that all work performed by such partnership, corporation or other business association is performed by or under the direct supervision of such License holder or holders.

- C. Contract with single bid:

Where the project does not involve separate bids pursuant to the New York General Municipal Law but where some electrical work is contemplated along with other work, the person, firm, partnership or corporation engaged to perform said electrical work

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must possess a valid Master/"Special" Electrician's license issued by the Westchester County Electrical Licensing Board.

- D. An electrical bidder must complete the "Certificate of License (Electrical)" of the Proposal Pages and will be required to furnish a copy of such license with the sealed Bid. Other bidders will be required to furnish a copy of such license for the applicable person engaged to perform the electrical work when request by the County, prior to awarding the contract.
- E. The license must be maintained at all times during the performance of the work contemplated under the contract. The suspension, revocation or the failure to maintain or renew such license shall, in addition to any other right or remedy available to the County, be grounds for immediate termination of the contract, effective immediately upon notice from the Commissioner.

34. LICENSE REQUIREMENTS (PLUMBING)

- A. In accordance with the requirements of Chapter 277, Article XV of the Laws of Westchester County, no person shall perform plumbing work under any contract with the County of Westchester except (i) a licensed Master Plumber; (ii) a certified Journey Level Plumber employed by and under the direction of a licensed Master Plumber; or (iii) an Apprentice Plumber working under the direct supervision and control of a Master Plumber or under the direct supervision and control of a certified Journey Level Plumber in the employ of a licensed Master Plumber.

In no event shall the County incur any liability to pay for any plumbing work performed in violation of the licensing requirements of Chapter 277, Article XV of the Laws of Westchester County.

- B. Contract with separate bids:

If the project is one where separate bid specifications are required pursuant to the provisions of the New York General Municipal Law, then any person, partnership, corporation, business organization or other business entity submitting a bid for the plumbing portion of the project must possess, at the time of submission of the Bid, a valid Master Plumber's license issued by the Westchester County Board of Plumbing Examiners in accordance with the Westchester County Board of Plumbing Examiners Rules and Regulations and Chapter 277 Article XV of the Laws of Westchester County, in particular Section 277.509A, which states as follows:

- A. No holder of a license or certification issued under this article shall authorize, consent to or permit the use of his or her license or certification by or on behalf of any other person. No person who has not qualified or obtained a license or certification under this article shall represent himself or herself to the public as holder of a license or certification issued under this article, either directly, by means of signs, sign cards metal plates or stationery, or indirectly in any other manner whatsoever. However, nothing herein shall be construed to prohibit the use of a license by the holder thereof for or on behalf of a partnership, corporation or other business association, provided that 51 percent or more of the control of the voting capital stock of such partnership, corporation or other business

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association is owned by one or more holders of a Westchester County master plumbing license and that all work performed by such partnership, corporation or other business association is performed by or under the direct supervision of such license holder or holders.

C. Contract with single bid:

Where the project does not involve separate bids pursuant to the New York General Municipal Law but where some plumbing work is contemplated along with other work, the person, firm, partnership or corporation engaged to perform said plumbing work must possess a valid Master Plumber's license issued by the Westchester County Board of Plumbing Examiners.

- D. A plumbing bidder must complete the "Certificate of License (Plumbing)" of the Proposal Pages and will be required to furnish a copy of such license and the County issued identity badge with the sealed Bid. Other bidders will be required to furnish a copy of such license and the County issued identity badge for the applicable person engaged to perform the plumbing work when request by the County, prior to awarding the contract.
- E. A restricted Master Plumber's license issued by the Westchester County Board of Plumbing Examiners shall satisfy the requirements of this section provided such restricted license authorizes the Master Plumber to engage in the business of plumbing within the local municipality in which the work under the contract is to be performed.
- F. The license must be maintained at all times during the performance of the work contemplated under the contract. The suspension, revocation or the failure to maintain or renew such license shall, in addition to any other right or remedy available to the County, be grounds for immediate termination of the contract, effective immediately upon notice from the Commissioner.

35. LICENSE REQUIREMENTS (HAULERS)

(Haulers Of Solid Waste; Recyclables; Construction And Demolition Debris; Garden And Yard Waste And/Or Scrap Metal)

A. DEFINITIONS:

- 1) "Class A" refers to all haulers except those whose hauling business is limited solely to Class C, Class D or Class E activities or whose recycling business is limited to Class B activities. Class A Licensees may also conduct Class B, Class C, Class D and Class E activities.
- 2) "Class B" refers to Recyclable brokers. Class B Licensees may also conduct Class C, Class D and Class E activities.
- 3) "Class C" refers to haulers who exclusively handle construction and demolition debris. Class C Licensees may also conduct Class D and Class E activities. With respect to Class C haulers, the following shall apply: a. Class "C-1" shall refer to a business or subsidiary which generates construction and demolition debris, as defined herein, and which, incidental to such business, transports, stores, processes, transfers or disposes of the construction and demolition debris generated by the

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operations of such business or subsidiary. Class "C-1" Licensees may also conduct Class E activities; b. Class "C-2" shall refer to all other businesses which otherwise transport, collect, store, transfer, process, or dispose of construction and demolition debris. Class "C-2" haulers may also conduct Class "C-1", Class D and Class E activities.

- 4) "Class D" refers to (i) haulers who collect, store, transport, transfer, process or dispose of garden and yard waste generated, originated or brought within the County where such garden and yard waste was previously generated by a person or entity other than the Licensees and/or (ii) haulers who collect, store, transport, transfer, process or dispose of garden and yard waste and which own, lease, or control one or more vehicles having three (3) or more axles which vehicles will be used in the collection, storage, transfer, transportation, processing or disposal of garden and yard waste generated, originated or brought within the County.
- 5) "Class E" refers to haulers who exclusively conduct a scrap peddler business.
- 6) "Construction and Demolition Debris" means uncontaminated Solid Waste resulting from the construction, remodeling, repair and demolition of structures and roads, and uncontaminated Solid Waste consisting of vegetation resulting from land clearing and grubbing, utility line maintenance and seasonal and storm-related cleanup. Such waste includes, but is not limited to, bricks, concrete and other masonry materials, soil, rock, wood, wall coverings, plaster, drywall, plumbing fixtures, non-asbestos insulation, roofing shingles, asphaltic pavement, glass, plastics that are not sealed in a manner that conceals other waste, electrical wiring and components containing no hazardous liquids, metals, and trees or tree limbs that are incidental to any of the above.
- 7) "Hauler" means any person excluding municipalities, the County and any County district including, but not limited to, Refuse Disposal District No. 1 and all County sewer and water districts, who, for a fee or other consideration, collects, stores, processes, transfers, transports or disposes of Solid Waste, Recyclables or construction and demolition debris that is generated or originated within the County or brought within the boundaries of the County for disposal, storage, transfer or processing.
- 8) "Recyclables" means those materials defined as "Recyclables" under Section 825.30 (8) of the Westchester County Source Separation Law.
- 9) "Scrap Peddler" shall mean any person who collects scrap materials for sale to a Recyclable broker using no more than one vehicle for collection and transportation of such materials.
- 10) "Solid Waste" means all putrescible and non-putrescible materials or substances, except as described in Paragraph 4 of 6 NYCRR Part 360-1.2(a), and/or regulated under 6 NYCRR Part 364, that are discarded or rejected as being spent, useless, worthless or in excess to the owners at the time of such discard or rejection including, but not limited to, garbage, refuse, commercial waste, rubbish, ashes, incinerator residue and construction and demolition debris. "Solid Waste" shall not be understood to include Recyclables as defined above.

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- B. **PLEASE TAKE NOTICE** - In accordance with the requirements of Chapter 826-a, Article III of the Laws of Westchester County, it is unlawful for any person to collect, store, transfer, transport or dispose of solid waste; recyclables; construction and demolition debris; garden and yard waste and/or scrap metal, as defined herein, that is generated or originated within the County or brought within the boundaries of the County for disposal, storage, transfer or processing, or to conduct any activities defined as Class A, Class B, Class C, Class D or Class E activities under Chapter 826-a of the Laws of Westchester County, in Westchester County (hereinafter collectively referred to as "hauling") without having first obtained a license therefore from the Westchester County Solid Waste Commission.

In no event shall the County incur any liability with respect to any hauling activities conducted by the bidder or any subcontractor of the bidder in violation of Chapter 826-a of the Laws of Westchester County.

- C. Where the project necessitates that hauling be performed, either the bidder or the person, partnership, corporation, business organization or other business entity engaged to perform such hauling work on behalf of the bidder (hereinafter the "subcontractor") must possess a valid license issued by the Westchester County Solid Waste Commission at the time of submission of the bid and throughout the duration of any contract issued pursuant thereto.
- D. A hauler bidder must complete the "Certificate of License (Hauler)" of the Proposal Pages and will be required to furnish a copy of such license with the sealed bid. Other bidders will be required to furnish a copy of such license for the applicable person engaged to perform the hauling work when requested by the County, prior to awarding the contract.
- E. The suspension, revocation, or the failure to maintain or renew such license may, in addition to any other right or remedy available to the County, be grounds for termination of the contract, effective immediately upon notice from the Commissioner. The bidder which is awarded the contract hereunder shall have a continuing obligation to notify the Commissioner, within (2) business days, of any suspension, revocation or other action taken with respect to any license issued by the Westchester County Solid Waste Commission which may limit or impair the bidder's ability, or the ability of any authorized subcontractor, to perform such hauling work in the County of Westchester.

It shall be the bidder's responsibility to ensure that any subcontractor who will perform the hauling services required under any contract issued pursuant to this bid specification has a valid license for the duration of the term of any contract awarded hereunder.

- F. In the event that a license held by the bidder or its subcontractor is revoked, suspended or otherwise discontinued by the Westchester County Solid Waste Commission, or in the event that the bidder is otherwise required to obtain the services of a new or alternate subcontractor for the hauling work, the bidder shall immediately notify the Commissioner and seek the Commissioner's approval for the use of such subcontractor to provide the hauling services which are required under the contract, and shall provide the Commissioner with a copy of the license issued by the Westchester County Solid Waste Commission to such subcontractor. No bidder or subcontractor shall provide

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hauling services under the contract until a copy of its license has been provided to the Commissioner and the Commissioner has approved of such bidder or subcontractor.

36. MINORITY PARTICIPATION POLICY

- A. Pursuant to Chapter 308 of the Laws of the County of Westchester, the County encourages the meaningful and significant participation of business enterprises owned by persons of color and women - Minority Business Enterprise (MBE) and Women Business Enterprise(WBE); on County of Westchester contracts.
- B. It is the goal of the County of Westchester to use its best efforts to encourage, promote and increase participation of business enterprises owned and controlled by persons of color or women (MBE/WBE) in contracts and projects funded by all departments of the County and to develop a policy to efficiently and effectively monitor such participation.
- C. In recognition of the need to promote the development of business enterprises owned and controlled by persons of color and women to achieve a goal of equal opportunity, and overcome the existing under representation of these groups in the business community, the County of Westchester acting through its Office of Economic Development shall as a lawful public and County purpose provide technical and informational assistance to such business enterprises with a particular emphasis on education programs to encourage participation in the contract procurement process.
- D. For the purposes of this Local Law, a business enterprise owned and controlled by women or persons of color shall be construed to mean a business enterprise including a sole proprietorship, partnership or corporation that is: (a) at least 51% owned by one or more persons of color or women; (b) an enterprise in which such ownership by persons of color or women is real, substantial and continuing; (c) an enterprise in which such ownership interest by persons of color or women has and exercises the authority to control and operate, independently, the day-to-day business decisions of the enterprise; and (d) an enterprise authorized to do business in this state which is independently owned and operated. In addition, a business enterprise owned and controlled by persons of color or women shall be deemed to include any business enterprise certified as an MBE or WBE pursuant to Article 15-a of the New York State Executive Law and implementing regulations, 9 NYCRR Subtitle N Part 540 et seq., or as a small disadvantaged business concern pursuant to the Small Business Act, 15 U.S.C. 631 et seq., and the relevant provisions of the Code of Federal Regulations as amended.
- E. The Contractor hereby acknowledges and agrees:
 - 1) That in the hiring of employees for the performance of work under this contract or any subcontract hereunder, no contractor, subcontractor, nor any person acting on behalf of such contractor or subcontractor, shall be reason of race, creed, color, religion, gender, age, ethnicity, disability, sex, alienage or citizenship status, national origin, marital status, sexual orientation, familial status, genetic predisposition or carrier status discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates;

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- 2) That no 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, religion, gender, age, ethnicity, disability, sex, alienage or citizenship status, national origin, marital status, sexual orientation, familial status, genetic predisposition or carrier status;
 - 3) That there may be deducted from the amount payable to the contractor by the County under this contract a penalty of fifty (50) dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of the contract;
 - 4) That this contract may be canceled or terminated by the County, 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 section of the contract; and
 - 5) The aforesaid provisions of this section covering every contract for or on behalf of the County for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.
 - 6) Contractor agrees to include, or require the inclusion of the above provision in any subcontract made pursuant to its contract with the County.
- F. In furtherance of the Contractor's obligation to make documented good faith efforts to utilize Minority Business Enterprises (MBE) and Women's Business Enterprises (WBE) for the Work required by this Contract, the Contractor shall provide the Minority/Women Business Enterprise Questionnaire signed by an officer of the Contractor, and any additional information requested by the County, including but not limited to the following, which shall be delivered to the Construction Administrator and _____, Program Manager of Minority- and Women-Owned Business Program, County of Westchester, Room 911, 148 Martine Avenue, White Plains, New York 10601 coincident with the Contractor's delivery to the County of its bid and shall be provided by the Contractor with any request for approval of subcontractors:
- 1 (a) The name, address, telephone number and contact person of each MBE and WBE solicited verbally by Contractor during the applicable period for the performance of any portion of the Contractor's Work and the date(s) that each such solicitation was made;
 - 1 (b) A description of the portion of the Contractor's Work for which each such solicitation is made.
 - 1 (c) A listing of the project documents, if any, furnished to each such MBE and WBE.
 2. A copy of each written solicitation sent by the Contractor to each MBE and WBE and the name and address of each MBE and WBE to whom the solicitation was made.
 - 3) The name and address of each MBE and WBE that performs any portion of the Contractor's Work, a description of such portion of the Work and the dollar

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amount therefore.

- 4) A statement that the Contractor reviewed a list of MBE and WBE contractors in their outreach efforts. A list can be found at www.westchestergov.com/mwob.
- 5) Indicate those MBE and WBE contractors found on the list that provided the type of subcontractor services required for this project. If none were found, please indicate.
- 6) Describe other outreach efforts, including other MBE and/or WBE lists, organizations or individuals that were contacted.

The failure of the low bidder to comply with the provisions of this subparagraph F may result in the County NOT awarding this contract to your firm. Failure of the Contractor to comply with the provisions of this subparagraph F may constitute a material breach of this Contract. Failure to comply with the Minority Participation Policy may be considered by the County when awarding contracts.

37. SEXUAL HARASSMENT POLICY

- A. As with discrimination involving race, color, religion, age, sexual orientation, disability, and national origin, Westchester County also prohibits sex discrimination, including sexual harassment of its employees in any form. The County will take all steps necessary to prevent and stop the occurrence of sexual harassment in the workplace.
 - 1) **This policy applies to all County employees and all personnel in a contractual relationship with the County.** Depending on the extent of the County's exercise of control, this policy may be applied to the conduct of non-County employees with respect to sexual harassment of County employees in the workplace.
 - 2) This sexual harassment policy includes, but is not limited to, inappropriate forms of behavior described by the Equal Employment Opportunity Commission.
- B. Sexual advances that are not welcome, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitutes sexual harassment when:
 - 1) Submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment; -OR-
 - 2) Submission to or rejection of such conduct by an individual is used as the basis for employment decisions, such as promotion, transfer, or termination, affecting such individuals; -OR-
 - 3) Such conduct has the purpose or effect of unreasonably interfering with an individual's work performance or creating an intimidating, hostile or offensive working environment.
- C. Sexual harassment refers to behavior that is not welcome, that is personally offensive, that fails to respect the rights of others, that lowers morale and that, therefore, interferes

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with an employee's work performance and effectiveness or creates an intimidating, hostile or offensive working environment.

38. SMOKE-FREE WORKPLACE POLICY

- A. By way of Executive Order No. 5 of 1998 and Local Law 3 of 2003, it is now the policy of the County of Westchester to institute a smoke-free “workplace”.
- B. Every indoor County “workplace”, shall become a smoke-free area. The smoking or carrying of lighted cigarettes, cigars, pipes, or any other tobacco-based products, or products that result in smoke, is hereby banned.
- C. Every indoor County “workplace” shall be covered under this Executive Order, including the County Jail in Valhalla and the Westchester County Center in White Plains. This Executive Order shall not, however, apply to County-owned facilities that are not County “workplaces”, such as employees housing or privately run restaurants on County property (e.g. at the County golf courses).
- D. The Richard J. Daronco County Courthouse shall not, for purposes of this Executive Order, be considered a County “workplace”, and therefore shall not be required to be smoke-free.
- E. This Executive Order is intended to be consistent with, and not modify, any provisions of the New York State Public Health Law.
- F. This Executive Order shall take effect immediately and remain in full force and effect until otherwise superseded or revoked.

39. COUNTY ENERGY EFFICIENT PURCHASING POLICY

- A. By way of Executive Order No. 9 of 2002, it is now the policy of the County of Westchester to institute an Energy Efficient Purchasing Policy.
- B. This policy shall apply to all purchases made by and for the County in accordance with applicable laws, rules and regulations.
- C. Wherever the price is reasonably competitive and the quality adequate for the purpose intended, purchase and utilization of products that meet Energy Star requirements for energy efficiency as determined by the United States Environmental Protection Agency and the United States Department of Energy is hereby recommended.
- D. If the Energy Star label is not available with respect to a particular product, than it is recommended that products in the upper twenty-five percent of energy efficiency as designated by the United States Federal Energy Management Program shall be purchased and utilized if the prices of those products are reasonably competitive and the quality adequate for the purpose intended.

40. RESTRICTION ON USE OF TROPICAL HARDWOODS

- A. The bidder/proposer shall not use or propose to use any tropical hardwoods or tropical hardwood products in any form, except in accordance with State Finance Law § 165 (Use of Tropical Hardwoods), as may be amended from time to time. Pursuant to the

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State Finance Law § 165, any bid/proposal which proposes or calls for the use of any tropical hardwood or wood product in the performance of the contract shall be deemed non-responsive.

41. DISCLOSURE OF RELATIONSHIPS TO COUNTY

- A. The successful bidder is required to complete the form entitled “Required Disclosure of Relationships to County” on Proposal Pages 32-33 before award of the contract.
- B. In the event that any information provided on the completed Proposal Pages entitled “Required Disclosure of Relationships to County” changes during the term of this agreement, the Contractor shall notify the Commissioner in writing within ten (10) days of such event by submitting a revised “Required Disclosure of Relationships to County” form.

42. CONTRACTOR DISCLOSURE STATEMENT

The Contractor and each Major Subcontractor represents that all information provided by the Contractor and Major Subcontractor in the form entitled “Contractor Disclosure Statement” on Proposal Pages 23-31 is in all respects true and correct. In the event the information provided on that document changes during the term of this agreement or for a period of three (3) years after the date that the Contractor and/or the Major Subcontractor receives final payment under this agreement, the Contractor and/or Major Subcontractor shall notify the Commissioner in writing within ten (10) days of such event by submitting a revised “Contractor/Major Subcontractor Disclosure Statement”. Bidders must complete the Required Disclosure of Relationships to County form. The Required Disclosure of Relationships to County form is located on Proposal Pages 32-33.

43. CRIMINAL BACKGROUND INFORMATION

Pursuant to Executive Order 1-2008 and subject to the applicable provisions of New York Correction Law §§ 752 and 753, the County shall have the right to bar the following “Persons Subject to Disclosure” (Persons shall mean individuals or legal entities) from providing work or services to the County or from being on County property:

(a) Consultants, Contractors, Licensees, Lessees of County owned real property, their principals, agents, employees, volunteers or any other person acting on behalf of said Contractor, Consultant, Licensee, or Lessee who is at least sixteen (16) years old, including but not limited to Subconsultants, Subcontractors, Sublessees or Sublicensees who are providing services to the County; and

(b) Any family member or other person, who is at least sixteen (16) years old, residing in the household of a County employee who lives in housing provided by the County located on County property.

If any of the above mentioned Persons Subject to Disclosure has either one of the following:

(a) A conviction of a crime (all felonies and misdemeanors as defined under the New York State Penal Law or the equivalent under Federal law or the laws of any other State);

(b) A pending criminal proceeding for a crime(s) as defined above; or

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(c) A refusal to answer such questions.

Where the following criteria apply:

(a) If any of the Persons Subject to Disclosure providing work or services to the County in relation to a County Contract are not subject to constant monitoring by County staff while performing tasks and/or while such persons are present on County property pursuant to the County Contract; and

(b) If any of the Persons Subject to Disclosure providing work or services to the County, in relation to a County Contract may, in the course of providing those services, have access to sensitive data (for example, Social Security Numbers and other personal/secure data); facilities (secure facilities and/or communication equipment); and/or vulnerable populations (for example, children, seniors and the infirm).

Accordingly, the Contractor is required to review the Instructions found in the instructions and complete “Contractor and all persons subject to Disclosure Certification Forms” located at Forms Pages 11-13 as well as any other applicable criminal disclosure forms (i.e., Forms Pages 14 through 19,” together with Forms Pages 11-13 collectively referred to as “Disclosure Forms”).

However, the following Persons Subject to Disclosure are **exempt** from Executive Order 1-2008: (i) those persons for whom the County has already conducted a background check and issued a security clearance that is in full force and effect; or (ii) those persons for whom another state or federal agency having appropriate jurisdiction has conducted a security and/or background clearance or has implemented other protocols or criteria for this purpose that apply to the subject matter of this Contract that is in full force and effect.

If a Person Subject to Disclosure is exempt from the disclosure described in Executive Order 1-2008 because of either “i” or “ii” above, then the Contractor shall notify the Procuring Officer¹ in the respective Department of its claim of exemption and it shall be the responsibility of the Procuring Officer to verify each exemption. If the Procuring Officer determines that the Contractor is exempt under sections “i” or “ii” above, the Procuring Officer shall confirm same with the Contractor and maintain a written record including all supporting details of the verification of and acknowledgement of said exemption.

If the Procuring Officer determines that the Contractor is not exempt under sections “i” or “ii” above, the Procuring Officer shall notify the Contractor in writing, and the appropriate Disclosure Forms shall be required.

It shall be the Contractor’s duty to disclose and to inquire of each and every Person Subject to Disclosure, whether they have been convicted of a crime or whether they are currently subject to pending criminal charges. It shall be the duty of the Contractor to submit a completed Certification Form “Forms Pages 11-13”annexed hereto as ,” which certifies that the Contractor and every Person Subject to Disclosure has been asked whether they have been convicted of a crime or are currently subject to pending criminal charges.

Should the Contractor or any Person Subject to Disclosure (also referred to as “Person”)

¹ “Procuring Officer” shall mean the head of the department or the individual(s) authorized by the head(s) of the department(s) undertaking the procurement and with respect to those matters delegated to the Bureau of Purchase and Supply pursuant to Section 161.11(a) of the Laws of Westchester County, the Purchasing Agent.

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affirmatively advise that they have been convicted of a crime said Person shall be identified in Forms Page 14 entitled “Names And Titles Of Persons Subject To Disclosure That Answered Yes” to any questions on Forms Pages 11-13 and shall complete Forms Pages 15-16 entitled, “Criminal Background Disclosure Form For Persons Who Have Been Convicted of A Crime.”

Should the Contractor or any Person Subject to Disclosure advise that they are subject to pending criminal charges, said Person shall be identified in Forms Page 14 and shall complete the form annexed hereto as Forms Pages 17-18 entitled, “Criminal Background Disclosure Form For Persons Who Are Subject to Pending Criminal Charges.”

Should the Contractor or any Person Subject to Disclosure refuse to answer whether they have been convicted of a crime or are currently subject to pending criminal charges, the name and title of said Person(s) shall be listed on Forms Page 19 entitled “Persons That refused To Answer”.

It shall be the duty of the Contractor to submit to the Procuring Officer all of the attached applicable Disclosure Forms prior to the commencement of this Contract. It is the responsibility of each Contractor to assure that all of their proposed Subcontractors complete the criminal background and disclosure certification forms and submit the forms to the Procuring Officer before they will be approved to perform work on the contract.

Under no circumstances shall the existence of a language barrier serve as a basis for the waiver of or an exception to this obligation. If the Contractor needs to obtain translation services to fulfill this obligation, it shall be at the sole cost and expense of the Contractor.

The Contractor shall be required to make the same inquiry and forward updated Disclosure Forms to the Procuring Officer regarding additional Persons Subject to Disclosure in connection with this Contract during the term of this Contract. **NO NEW PERSON SUBJECT TO DISCLOSURE SHALL PERFORM WORK OR SERVICES OR ENTER ONTO COUNTY PREMISES UNTIL THE UPDATED DISCLOSURE FORMS ARE FILED WITH THE PROCURING OFFICER.**

THE CONTRACTOR HAS A CONTINUING OBLIGATION TO MAINTAIN THE ACCURACY OF THE DISCLOSURE FORMS FOR THE DURATION OF THIS CONTRACT, INCLUDING ANY AMENDMENTS OR EXTENSIONS THERETO AND SHALL PROVIDE ANY UPDATES TO THE PROCURING OFFICER AS NECESSARY TO COMPLY WITH THE DISCLOSURE REQUIREMENTS BY EXECUTIVE ORDER 1-2008.

Any failure by the Contractor to comply with the disclosure requirements of Executive Order 1-2008, absent proof of exemption deemed satisfactory by the County Procuring Officer, may be considered by the County, a material breach by the Contractor and may be grounds for immediate termination of this Agreement by the County.

44. MANDATORY OSHA CONSTRUCTION SAFETY AND HEALTH TRAINING

Pursuant to NYS Labor Law §220-h – On all public work projects of at least \$250,000 all laborers, workers and mechanics employed, in the performance of the contract on the public work site, either by the contractor, sub-contractor or other person doing or contracting to do the

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whole or a part of the work contemplated by the contract, are required to be certified as having successfully completed an OSHA construction safety and health course of at least 10 hours prior to performing any work on the project.



3. GENERAL CLAUSES

DEPARTMENT OF PUBLIC WORKS

Division of Engineering

GENERAL CLAUSES

1. MATERIAL AND WORKMANSHIP

It is the intent of these specifications to require first-class work and new and best quality materials. For any unexpected features arising during the progress of the work and not fully covered herein the specifications shall be interpreted to require first-class work and materials, and such interpretations shall be binding upon the Contractor.

- 1) Upon award of the Contract, the Contractor shall furnish in writing to the Construction Administrator the sources of supply for concrete, and other materials that it proposes to use in the work, and material shall not be furnished from other sources of supply except after written approval by the Construction Administrator. The Contractor shall, before ordering equipment verify that Suppliers of equipment will provide the required warranties, guarantees, and maintenance services.

2. DEFINITIONS

COMMISSIONER - The head of the Department of Public Works of the County of Westchester.

CONSTRUCTION ADMINISTRATOR- The representative of the Commissioner of Public Works at the project site who, unless specifically designated otherwise in the Contract, shall in the first instance, make such determinations as are necessary for the expeditious completion of the Work, except for those determinations that are reserved to the Commissioner.

CONTRACT - Shall mean each of the various parts of these documents both as a whole or severally and except for titles, subtitles, headings and table of contents, shall include the Notice to Bidders, Information for Bidders, the Proposal, the Specifications, the Performance Bond, the Plans, the Contract Form, and all addenda and provisions required by law.

CONTRACTOR - Party of the second part to the Contract acting directly or through its agents, subcontractors, or employees, and who is responsible for all debts pertaining to and for the acceptable performance of the work for which it had contracted.

COUNTY - Party of the first part to the Contract as represented by the Board of Acquisition and Contract and the Commissioner of Public Works for the County of Westchester.

ENGINEER - An Engineer or Architect that designed the project and is serving as the duly authorized representative of the Commissioner of Public Works who, in addition to the duties set forth in the Contract, shall, in the first instance, make such determinations as are necessary to ensure the Contractor's compliance with its obligations for the preparation and submission of shop drawings and all other submittals required for the Work. If there is no Engineer the duties of the Engineer shall be performed by the Construction Administrator and all references in this

GENERAL CLAUSES

Agreement to the Engineer shall be deemed to mean the Construction Administrator.

MAJOR SUBCONTRACTOR- Subcontractors performing all or a portion of the work for Electrical; Heating, Ventilating and Air Conditioning; Fire Prevention; General Construction; and/or any Subcontractor whose subcontract price is equal to or greater than ten percent (10%) of the Contract Price.

OWNER - The County of Westchester.

PLANS - All official drawings or reproductions of drawings pertaining to the work or to any structure connected therewith.

SPECIFICATIONS - The body of directions, requirements, etc. contained in this present volume, together with all documents of any descriptions and agreements made (or to be made), pertaining to the methods(or manner) of performing the work or to the quantities and quality. Specifications shall also include the Notice to Contractors, Instructions to Bidders, Bond, Proposal and Contract Agreement.

SURETY - The corporate body, which is bound with and for the Contractor and which engages to be responsible for the faithful performance of the contract, and to indemnify the County against all claims for damages.

A.A.S.H.O. - American Association of State Highway Officials

A.R.E.A. - American Railway Engineering Association

A.S.T.M. - American Society for Testing Materials

A.W.W.A. - American Water Works Association

N.E.C. - National Electrical Code

N.E.M.A. - National Electric Manufacturers Association

3. BOUNDARIES OF WORK

The County will provide land or rights-of-way for the work specified in this Contract. Other contractors, employees or concessionaires of the county, may for all necessary purposes enter upon the work and premises used by the Contractor, and the Contractor shall give to other contractors and employees of the County all reasonable facilities and assistance for the completion of adjoining work.

4. OVERLAPPING WORK

The Contractor shall take notice that because of work on other contracts within and adjacent to the contract limits it may not have exclusive occupancy of the territory within or adjacent

GENERAL CLAUSES

to the contract limits, and that during the life of this contract the owners and operators of Public Utilities may make changes in their facilities.

The said changes may be made by utility employees or by contract within or adjacent to the contract limits and may be both temporary and permanent.

The Contractor shall cooperate with other Contractors and owners of various utilities and shall coordinate and arrange the sequence of its work to conform with the progressive operations of work already or to be put under contract. Cooperation with Contractors already or to be engaged upon the site is essential to properly coordinate the construction efforts of all Contractors, Utility Owners and Subcontractors engaged in work within and adjacent to the contract limits.

The Contractor shall coordinate the work of its various Subcontractors. Their respective operations shall be arranged and conducted so that delays are avoided. Where the work of the Contractor or Subcontractor overlaps or dovetails with that of other Contractors, materials shall be delivered and operations conducted so as to carry on the work continuously in an efficient and workmanlike manner. The Contractor shall coordinate its work to be done hereunder with the work of the other Contractor(s) and the Contractor shall fully cooperate with such other Contractor(s) and carefully fit its own work to that provided under other contracts as may be directed by the Construction Administrator. If the Construction Administrator shall determine that the Contractor is failing to coordinate its work with the work of the other Contractor(s) as the Construction Administrator has directed, then the Commissioner shall have the right, at its sole option, to withhold any payments otherwise due hereunder until the Construction Administrator's directions are complied with by the Contractor and/or deduct the costs incurred by the County due to the Contractor's failure or refusal to so cooperate. Delays or oversights on the part of the Contractor or Subcontractors or Utility Owners in performing their work in the proper manner thereby causing cutting, removing and replacing work already in place, shall not be the basis for a claim for extra compensation.

In the event of interference between operations of Utility Owners and other Contractors, or among the Contractors themselves, the Construction Administrator shall be the sole judge of the rights of each Contractor insofar as the sequence of work necessary to expedite the completion of the entire project, and in all cases its decision shall be final. The Contractor agrees that it has included in its unit prices bid for the various items of the contract the possible additional cost of performing the work under this contract because it may not have a clear site for its work and because of possible interference of roadway use, other Contractors and necessary utility work, and the necessity or desirability of opening certain sections of pavement to traffic before the entire work is completed. The County shall not be liable for any damages suffered by any Contractor by reason of another Contractor's failure to comply with the directions of the Construction Administrator, or by reason of another Contractor's default in performance or by any act or failure to act of any Utility Owner or anyone working on its behalf, it being understood that the County does not guarantee the responsibility or continued efficiency of any Contractor or Utility Owner and under no circumstances shall the County be liable to any Contractor or Utility Owner for any delays, interferences or any other impediment or hindrance to the Contractor's or Utility Owner's work .

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Should the Contractor sustain any damage through any act or omission of any other contractor having a Contract with the County 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 supplier or subcontractor of whatever tier of such contractor, the Contractor shall have no claim against the County for such damage, but shall have a right to recover such damage from the other contractor under the provision similar to the following provision that has been or will be inserted in the Contracts with such other contractors.

Should any other Contractor having or who shall hereafter have a Contract with the County for the performance of work upon the site sustain any damage through any act or omission of the Contractor hereunder or through the act or omission of any subcontractor of whatever tier of the Contractor, the Contractor agrees to reimburse such other Contractor for all such damages and to defend at his own expense any suit based upon such claim and if any judgment or claims against the County shall be allowed the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses, including attorney's fees, incurred by the County in connection therewith and to indemnify and hold the County harmless from all such claims.

The County's right to indemnification hereunder shall not be diminished or waived by its assessment against the Contractor of liquidated damages as may be provided elsewhere herein.

Delays in availability of any part of the site or any delays due to interference between the several Contractors and the Utility Owners shall be compensated for by the Construction Administrator solely through granting an extension of time in which to complete the work of the contract without assessment of Engineering charges. The Contractor in submitting its bid hereby agrees that it shall make no other claim against the County for any damages due to such delays or interference.

5. PROPER METHOD OF WORK AND PROPER MATERIALS

The Construction Administrator shall have the power in general to direct the order and sequence of the work, which will be such as to permit the entire work under this contract to be begun and to proceed as rapidly as possible, and such as to bring the several parts of the work to a successful completion at about the same time.

If at any time before the commencement or during the progress of the work the materials and appliances used or to be used appear to the Construction Administrator as insufficient or improper for securing the quality of work required, or the required rate of progress, he may order the Contractor to increase their efficiency or to improve their character, and the Contractor shall promptly conform to such order; but the failure of the Construction Administrator to demand any increase of such efficiency or improvement shall not release the Contractor from its obligation to secure the quality of work or the rate of progress specified.

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6. CONTROL OF AREA

Unloading of materials and parking of equipment shall be subject to the orders of the Construction Administrator so far as he may find necessary for the protection and safety of the traveling public and the preservation of property.

7. PERMITS, FEES, ETC.

The County will obtain at its sole cost the necessary New York State Pollutant Discharge Elimination System ("SPDES") Permit and will sign the associated Notice of Intent ("NOI"). The Contractor and its subcontractors will sign the required Certification Statement (a copy of which is contained as Proposal Page) when it signs the contract.

All necessary permits from County, State or other concerned Public Authorities shall be secured at the cost and expense of the Contractor. It shall also give all notices required by law, ordinance, or the rules and regulations of the concerned Public Bureaus or Departments, and also as a part of the Contract, comply without extra charge or compensation with all State Laws and all other Ordinances or Regulations that may be applicable to this work. Contractor, however, shall first notify the Commissioner before proceeding with securing of all necessary permits and the giving of required notices.

8. TRAFFIC

The General Contractor shall be responsible for the Maintenance and Protection of traffic at all times until the date of completion and acceptance of its work.

During the whole course of the work the Contractor shall so conduct its work and operations so as to interfere with traffic passing the work as little as possible and effect by every reasonable means the safety and comfort of pedestrians, vehicles and vehicle passengers passing the work.

9. INSPECTION

The Contractor shall at all times provide convenient access and safe and proper facilities for the inspection of all parts of the work. No work, except such shop work as may be so permitted, shall be done except in the presence of the Construction Administrator or his/her assistants. No material of any kind shall be used upon the work until it has been inspected and accepted by the Construction Administrator. All materials rejected shall be immediately removed from the work and not again offered for inspection. Any materials or workmanship found at any time to be defective shall be remedied at once, regardless of previous inspection. The inspection and supervision of the work by the Construction Administrator is intended to aid the Contractor in supplying labor and materials in accordance with the specifications, but such inspection shall not operate to release the Contractor from any of its contract obligations.

10. STOPPING WORK

The Commissioner, Construction Administrator or Engineer may stop by written order any work or any part of the work under this contract if, in his/her opinion, the methods employed

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or conditions are such that unsatisfactory work might result. When work is so stopped it shall not be resumed until the methods or conditions are revised to the satisfaction of the Commissioner, which must be signified in writing. The Contractor agrees to make no claim for increased costs arising from the issuance of any stop work order.

11. DIMENSIONS

Figured dimensions on the plans shall be given preference over scaled dimensions, but shall be checked by the Contractor before starting construction. Any errors, omissions or discrepancies shall be brought to the attention of the Engineer and his/her decision thereon shall be final.

12. PAYMENTS TO COUNTY

Wherever in the Contract Documents the Contractor is required to make a payment to the County, the Contractor agrees that the County has the option to withhold such sum(s) from payments otherwise due to the Contractor and that all such sums withheld shall be deemed not to be earned by the Contractor.

13. PROTECTION OF UTILITIES AND STRUCTURES

The Contractor shall be responsible for the preservation of all public and private underground and surface utilities/structures at or adjacent to the construction work; insofar as they may be endangered by the work. This shall hold true whether or not they are shown on the contract drawings. If they are shown on the drawings, the County does not guarantee their locations even though the information will be from the best available sources.

The Contractor shall give ample and reasonable notice to all private, corporate or municipal owners before work is done near their utility or structure; shall properly protect all utilities/structures encountered; shall at their expense repair/replace any items that are damaged; and shall proceed with caution to prevent undue interruptions to utility services.

Investigation and/or on-site mark-out, by the County, must be done prior to excavation work at the Valhalla Campus. This investigation/mark-out is to serve as a guide for the Contractor and does not absolve the Contractor from the responsibility to repair/replace identified or non-identified utilities/structures, at no cost to the County.

All excavation work performed at the Valhalla Campus requires the submission of a completed "Ground Penetration" form/sketch(es) will be distributed to the appropriate utility owners. Therefore, the Contractor should assume that no excavation work can be performed until approximately twenty (20) working days after submission of the form/sketch(es), but not prior to approval by the DPW-BO Superintendent of Buildings.

14. PROTECTION OF WATER RESOURCES & THE ENVIRONMENT

The Contractor is responsible to review the specifications and drawings as they relate to this Agreement to ascertain what procedures must be followed in order to comply with all applicable stormwater management, water quality control, erosion, and sediment control

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laws, rules, regulations and permits. If the Contractor is of the opinion that any work required, necessitated, or contained in the specifications or otherwise ordered conflicts with the applicable stormwater management, water quality control, erosion, and sediment control laws, rules, regulations, procedures, and permits, including, without limitation, all applicable provisions of the New York State Stormwater Management Design Manual, and the New York Standards and Specifications for Erosion and Sediment Control as they may be amended from time to time, it must promptly notify the First Deputy Commissioner of the Department of Public Works in writing.

In addition to all other requirements contained in this Agreement, the Contractor recognizes and understands that it is an essential element of this Agreement that the Contractor complies with the County's policies to protect water resources and the environment. The Contractor must comply with all applicable stormwater management, water quality control, erosion, and sediment control laws, rules, regulations, permits, procedures and specifications, including, without limitation, all applicable provisions of the New York State Stormwater Management Design Manual,¹ the New York Standards and Specifications for Erosion and Sediment Control as they may be amended from time to time. All of these documents should be obtained from the New York State Department of Environmental Conservation to ensure that the Contractor has the latest version. It should be noted that the standards set forth in the New York State Stormwater Management Design Manual, and the New York Standards and Specifications for Erosion and Sediment Control apply to ALL work done for the County, regardless of the size of the project. In case of a conflict among the governmental regulations and standards, the most stringent regulation, standard or recommendation shall apply to the work done under this Agreement.

The Contractor and its subcontractors shall execute the required Stormwater Pollution Prevention Certification, which is located at Proposal Page 20. In addition, the Contractor acknowledges that if the work required under this Agreement requires that a State Pollutant Discharge Elimination System ("SPDES") permit be obtained from the New York State Department of Environmental Conservation, then the Contractor must comply with the terms and conditions of the SPDES permit for stormwater discharges from construction activities and the Contractor will not take any action or fail to take any necessary action that will result in the County being held to be in violation of said permit or any other permit. The Contractor shall cooperate with the County in obtaining the permit and comply with the SPDES permit and all other applicable laws, rules, regulations and permits.

The Contractor shall provide, as the Commissioner or his designee may request, proof of compliance with the County's policies to protect water resources and the environment, and all applicable stormwater management, water quality control, erosion and sediment control laws, rules, regulations, permits, procedures and specifications.

The Contractor is responsible to ascertain which of the laws, rules, regulations, permits and standards referenced above affect its construction activities, and the Contractor shall be solely responsible for all costs and expenses, including any penalties or fines, incurred by the County, due to the Contractor's failure to comply with such applicable laws, rules,

¹ available at <http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html> - The location of this reference is provided to assist the Contractor; it does not relieve the Contractor from the obligation of obtaining and complying with the latest version of the document.

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permits, regulations, standards and County policies. The Contractor shall be responsible to defend and indemnify the County from any and all claims resulting from the Contractor's failure to comply with the applicable laws, rules, regulations, permits, standards and County policies.

Failure of the Contractor to comply with the County's policies to protect water resources and the environment, and all applicable stormwater management, water quality control, erosion and sediment control laws, rules, regulations, permits, procedures and specifications may result in the withholding of progress payments to the Contractor by the County. Such withholding of progress payments shall not relieve the Contractor of any requirements of the Agreement including the completion of the work within the specified time, and any construction sequence requirement of the Agreement.

The Contractor acknowledges that its failure to comply with the County's policies to protect water resources and the environment, and all applicable stormwater management, water quality control, erosion and sediment control laws, rules, regulations, permits, procedures and specifications shall constitute a material breach under this contract. For the breach or violation of this provision, without limiting any other rights or remedies to which the County may be entitled, the County shall have the right, in its sole discretion to suspend, discontinue or terminate this Agreement immediately upon notice to the Contractor. In such event, the Contractor shall be liable to the County for any additional costs incurred by the County in the completion of the project.

The failure of the Contractor to comply with these requirements could lead to a determination that the Contractor is not a responsible bidder when the Contractor is bidding on other projects.

15. SANITARY REGULATIONS

The Contractor shall obey and enforce such sanitary regulations and orders and shall take such precautions against infectious diseases as may be deemed necessary. The building of shanties or other structures for housing the men, tools, machinery or supplies will be permitted only at approved places, and the sanitary condition of the grounds in and at such shanties or other structures must be at all times maintained in a satisfactory manner.

16. CLEANING UP

Upon completion of the work, the Contractor shall remove all equipment, rubbish, debris and surplus materials from the buildings, and grounds, and provide a suitable dumping place for such materials. The premises shall be left in a neat, clean and acceptable condition.

No litter, debris of any kind shall be allowed to accumulate for more than one day in any portion of the buildings or grounds, and must be removed from the area at the end of each workday.

17. PREVENTION OF DUST HAZARD

In accordance with the New York State Labor Law, Section 22a, in the event a silica or other harmful dust hazard is created due to construction operations under the contract, the Contractor shall install, maintain and keep in effective operation the appliances and methods

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for the elimination of such silica dust or other harmful dust as have been recommended and approved by State and local authorities.

18. REPRESENTATIVE ALWAYS PRESENT

The Contractor in case of its absence from the work shall have a competent representative **fluent in English** or foreman present, who shall obey without delay, all instructions of the Construction Administrator in the prosecution and completion of the work in conformity with this contract, and shall have full authority to supply labor and material immediately.

19. WORK IN BAD WEATHER

During freezing, stormy or inclement weather, no work shall be done except such as can be done satisfactorily and in a manner to secure first-class construction throughout.

20. PROTECTION OF WORK UNTIL COMPLETION

The Contractor shall be responsible for the protection and maintenance of its work until the same has been accepted by the Owner and shall make good any damage to the work caused by floods, storms, settlements, accidents, or acts of negligence by its employees or others so that the complete work when turned over to the Owner will be in first-class condition and in accordance with the plans and specifications.

21. REMOVAL OF TEMPORARY STRUCTURES AND CLEANING UP

On or before the completion of the work the Contractor shall, without charge therefore, tear down and remove all buildings and other structures built by him for facilitating the carrying out of the work, shall remove all rubbish of all kinds from the grounds which he has occupied, shall do any small amount of additional trimming and grading and shall leave the entire work and premises clean, neat and in good condition. The Contractor shall provide at its own expense suitable dumping places for such material. When the necessity for protecting traffic ends, the Contractor shall remove all signs, lighting devices, barricades and temporary railings from the site of the work.

22. GROSS LOADS HAULED ON HIGHWAY

The Contractor shall at no time during the construction of this contract, haul gross loads exceeding the legal limit prescribed by the Highway Law over the highways of access to, or the highway included in this contract.

23. CONCRETE BATCH PROPORTIONS - YIELD

No Construction Administrator or Engineer is authorized to instruct or inform the Contractor, or any of its agents or employees, or its concrete supplier as to the weights of the ingredients to be used to produce a cubic yard of concrete or as to the yield to be used to produce a cubic yard of concrete or as to the yield to be expected from any batch. The Contractor shall make its own determination and give its own instructions to its agents, employees and concrete supplier as to the total quantity of ingredients to be purchased as a

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cubic yard of concrete. The right is reserved to the Construction Administrator and Engineer, however, to verify yields after batch weights have been established by the Contractor and to order a reduction in total weight per load in the event his/her calculations show that the rated capacity of truck mixers, if approved for use, will be exceeded.

24. DAMAGE DUE TO CONTRACTOR'S OPERATIONS

In the event that damage is caused to structures, surfacing, pavement, shrubbery, trees or to grassed areas through trucking operations, delivery of materials, the actual performance of the work, or other causes, the Contractor shall fully restore the same to their original condition at its own expense. In the event that more than one contractor causes damages to any one area, the Director of Project Management will apportion the amount of repair work to be done by each contractor. The decision of the Director of Project Management shall be final and binding upon the Contractor(s) and may not be challenged except pursuant to a proceeding brought pursuant to Article 78 of the Civil Practice Law and Rules.

25. PROPERTY DAMAGE

The Contractor shall not enter upon nor make use of any private property along the line of work except when written permission is secured from the owner of that property. In case of any damage or injury done along the line of work in consequence of any act or omission on the part of the Contractor, or any one in its employ, in carrying out the contract, the Contractor shall at its own expense restore the same or make repairs as are necessary in consequence thereof in a manner satisfactory to the owner of the affected property; provided, however, that the obligation thus assumed by the Contractor shall not inure directly or indirectly to the benefit of any insurer of physical damage to property or loss of use, rents or profits of property regardless of whether the insurer has actually paid the claim or made only a loan to its insured, nor to the latter if it shall waive or abandon any claim against its insurer or insurers.

In case of failure on the part of the Contractor to restore or repair such property in a manner satisfactory to the owner of the affected property, the party of the first part may upon forty-eight hours notice to the Contractor proceed with such restoration or repair. The expense of such restoration or repair shall be deducted from any monies, which are due or may become due the Contractor under its contract. The Construction Administrator shall be the sole judge as to what constitutes failure to restore or repair as above stated and service of notice by mail addressed to the Contractor at the address stated in the proposal shall be sufficient.

26. CLAIMS FOR DAMAGES

The Contractor agrees that it will make no claim against the County or any of its representatives for damages for delay, interference or disruption of any kind in the performance of its Contract and further agrees that any such claim arising from acts or failure to act of the County or any of its representatives shall be fully and exclusively compensated for by an extension of time to complete the performance of the work as provided herein.

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27. EXTENSIONS OF TIME

An extension or extensions of time may be granted only by the Commissioner and only upon a verified application therefore by the Contractor. Each application for an extension of time must set forth in detail the nature of each cause of delay in the completion of the work, the date upon which each such cause of delay began and ended, and the number of days attributable to each of such causes. If the schedule for this project is based upon the Critical Path Method, the Contractor must also demonstrate that the delay for which an extension of time is sought occurred on the critical path. A formal written notice of the Contractor's intent to apply for an extension of time must be submitted to the Commissioner within seven (7) calendar days of the start of the alleged delay. The formal application for the extension of time must be submitted to the Commissioner no later than ten (10) calendar days after the end of the delay, but in no event later than the Contractor's submittal of its application for its substantial completion payment. The failure of the Contractor to timely submit either its formal written notice of its intent to apply for an extension of time or the application thereof shall be deemed a waiver of any entitlement to any extension of time.

The Contractor shall be entitled to an extension of time for delay in completion of the work caused solely (1) by the acts or omissions of the County, its officers, agents or employees; or (2) by the acts or omissions of other Contractors on this project; or (3) by supervening conditions entirely beyond the control of either party hereto (such as, but not limited to, Acts of God, excessive inclement weather, war, or any 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).

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 Engineer or Commissioner. If one of multiple causes of delay operating concurrently results from any act or omission of the Contractor or of its subcontractors of whatever tier, and would of itself (irrespective of concurrent causes) have delayed the work, no extension of time will be allowed for the period of delay resulting from such act or omission and the Contractor shall re-arrange his Progress Schedule and operations so as to complete the Work within the time set forth in the Contract and minimize the impact of the Work on the other Prime Contractors.

The determination made by the Commissioner or Engineer on an application for an extension of time shall be binding and conclusive on the Contractor and may not be challenged except in a proceeding commenced pursuant to Article 78 of the Civil Practice Law and Rules.

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 not operate as waiver on the part of the County of any of its rights or remedies under this contract nor shall it relieve the Contractor from his obligation under the Contract, including without limitations its liability to the County for liquidated damages, engineering costs, delays, damages, and/or costs incurred by the County.

If the Commissioner deems it advisable and expedient to have the Contractor complete and furnish the Work after the expiration of the time of Completion of Work (see "Required

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Time For Completion Of The Work” of the General Requirements) and in order that the County’s fiscal officers may be permitted to make payment to the Contractor for Work performed beyond that date, the Commissioner may extend the Contract solely for the purpose of enabling the Contractor to be paid for Work performed. This extension shall in no way relieve the Contractor from his obligation under the Contract, including without limitations its liability to the County for liquidated damages, engineering costs, delays, damages, attorney’s fees and/or costs incurred by the County, nor shall such extension of time be asserted by the Contractor in any action or proceeding as evidence that it completed its work in a timely manner.

The time necessary for review by the Engineer of all submittals including vendors, shop drawings, substitutions, etc., and delays incurred by normal seasonal and weather conditions should be anticipated and is neither compensatory nor eligible for Extensions of Time.

When the Work embraced in the Contract is not completed on or before the date specified herein, engineering and inspection expenses incurred by the County of Westchester upon the Work from the completion date originally fixed in the Contract to the final date of completion of the Work may be charged to the Contract and be deducted from the final monies due the Contractor.

28. REQUEST FOR APPROVAL OF EQUAL

A. GENERAL REQUIREMENTS

Wherever in the Contract Documents an article, material, apparatus, product or process is called for by trade name or catalog reference, or by the name of the patentee, manufacturer or dealer, it is understood that it constitutes the standard requirement to meet the contract specifications. Where two or more articles, materials, apparatus, products or processes are listed as acceptable by reference to trade name or otherwise, the choice of these will be optional to the bidder.

Bidders may base their bid on one of the specified items, or they may base their bid on an “equal”. However, the bidder should be aware that the County makes the final determination as to what constitutes an equal.

If the Engineer shall reject the proposed equal as not being the equal of that specifically named in the contract, the successful bidder (Contractor) shall immediately proceed to furnish the designated article, material, apparatus, product or process as specified or an approved equal without additional cost or time delay to the County.

B. REVIEW PROCESS

- 1) Within fifteen (15) days from the Notice to Proceed, requests for approval of equals must be proposed to the Commissioner on the “Request For Approval Of Equal” form of the Sample Forms. This Period for submitting requests will be strictly enforced. Such requests shall conform to the requirements of this Article.
- 2) Requests for approval of equals will be received and considered from Prime Contractors only and not from manufacturers, suppliers, Subcontractors, or other third parties.
- 3) If the materials and equipment submitted are offered as equals to the Contract

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Documents the Contractor shall advise the County and the Engineer of the requested equal and comply with the requirements hereinafter specified in this Article.

- 4) Where the acceptability of an equal is conditioned upon a record of satisfactory operation and the proposed equal does not fulfill this requirement, the Engineer, at his/her sole discretion, may accept the equal if the Contractor provides a bond or cash deposit which guarantees replacement at no cost to the County for any failure occurring within the specified time. The equal item must meet all other technical requirements contained in the Specification.
- 5) The successful bidder shall furnish such information as required by the Engineer to demonstrate that the equal article, material, apparatus, product or process is the equal of that specified in quality, finish, design, efficiency and durability and has been elsewhere demonstrated to be equally serviceable for the purpose for which it is intended. The Contractor shall set forth the reasons for desiring to utilize the proposed equal.
- 6) Contractor shall submit:
 - a. For each proposed request for approved equal sufficient details, complete descriptive literature and performance data together with samples of the materials, where feasible, to enable the Engineer to determine if the proposed request for approved equal is equal, including manufacturer's brand or trade names, model numbers, description of specification of item, performance data, test reports, samples, history of service, and other data as applicable.
 - b. Certified tests, where applicable, by an independent laboratory attesting that the proposed equal is equal.
 - c. A list of installations where the proposed equal equipment or materials is performing under similar conditions as specified.
- 7) Requests for approval of equal after the period set forth in B. REVIEW PROCESS, Paragraph 1, above will not be accepted for evaluation except in case of strikes, discontinuance of manufacturer or other reason deemed valid by the Engineer whereby the specified products or those approved are unattainable. In such case the Contractor shall provide substantial proof that the acceptable products are unavailable.
- 8) Where the approval of an equal requires revision or redesign of any part of Work, including that of other Contracts, all such revision and redesign, and all new drawings and details required therefore, shall be provided by the Contractor at its own cost and expense, and shall be subject to the approval of the Commissioner.
- 9) In the event that the Engineer is required to provide additional engineering services, then the engineer's charges for such additional services shall be promptly paid by the Contractor to the County.
- 10) Any modifications in the Work required under other Contracts to accommodate the changed design will be incorporated in the appropriate Contracts and any resulting increases in Contract prices will be paid by the Contractor who initiated the

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changed design to the County.

- 11) In all cases the Engineer shall be the judge as to whether a proposed equal is to be approved. The Contractor shall abide by his/her decision when proposed equal items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No equal items shall be used in the Work without written approval of the Engineer.
- 12) In making request for approval of equal, Contractor represents that:
 - a. Contractor has investigated proposed equal, and determined that it is equal to or superior in all respects to the product, manufacturer or method specified.
 - b. Contractor will provide the same or better warranties or bonds for proposed equal as for product, manufacturer or method specified.
 - c. Contractor waives all claims for additional costs or extension of time related to proposed equal that subsequently may become apparent.
 - d. 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 equal proposed by the Contractor or by reason of refusal of the Engineer to approve an equal proposed by the Contractor. Any delays arising out of consideration, approval, or utilization of an equal shall be the sole responsibility of the Contractor requesting the equal and it shall arrange its operations to make up the time lost.
- 13) Proposed Equal Will Not Be Accepted If:
 - a. Acceptance will require substantial revision of Contract Documents.
 - b. They will change design concepts or Technical Specifications.
 - c. They will delay completion of the Work, or the Work of other Contractors.
 - d. They are indicated or implied on a Shop Drawing and are not accompanied by a formal request for approval of equal from Contractor.
- 14) Only those products originally specified and/or added by approved requests for equals submitted in accordance with the preceding paragraphs may be used in the Work. Whenever requests for equals are approved, it shall be understood that such approval is conditional upon strict conformance with all requirements of the Contract and further subject to the following:
 - a. Any material or article submitted for approval in accordance with the above procedure must be equal, in the sole opinion of the Engineer, to the material or article specified. It must be readily available in sufficient quantity to prevent delay of any Work; it must be available in an equivalent color, texture, dimension, gauge, type and finish as to the item or article specified; it must be equal to the specified item in strength, durability, efficiency, serviceability, compatibility with existing systems, ease and cost of maintenance; it must be compatible with the design and not necessitate substantial design modifications; it must be equal in warranties and guarantees; its use must not impose substantial additional Work, or require substantial changes in the Work of any

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other Contractor. Availability of spare parts shall be assured for the useful life of the Project.

- b. The Engineer reserves the right to disapprove, for aesthetic reasons, any material or equipment on the basis of design or color considerations alone, without prejudice to the quality of the material or equipment, if the manufacturer cannot meet the required colors or design.
 - c. All requests for approval of equals of materials or other changes from the contract requirements shall be accompanied by an itemized list of all other items affected. The Engineer shall have the right, if such is not done, to rescind any approvals for equals or changes and to order such Work removed and replaced with Work conforming to the specified requirements of the contract, all at the Contractor's expense, or to assess all additional costs resulting from the equal to the Contractor.
- 15) Approval of an equal will not relieve Contractor from the requirement to submit Shop Drawings or any of the provisions of the Contract Documents.
- 16) In the event that the Engineer is required to provide additional engineering services as a result of a request for approval of an equal of materials or equipment which are not "or equal" by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, or for evaluation of deviations from Contract Documents, then the Engineer's charges in connection with such additional services shall be paid by the Contractor to the County.
- 17) The Contractor shall respond to required submittals with complete information and with a degree of accuracy to achieve approvals within three (3) submissions. All costs to the Engineer involved with subsequent submissions requiring approval, will be paid by the Contractor to the County.

29. SUBSTITUTION

- A. Should the Contractor desire to substitute other articles, materials, apparatus, products or processes than those specified or approved as equal, the Contractor shall apply to the Engineer in writing for approval of such substitution. It should be noted that the bid shall not be based on a substituted article, material, apparatus, product or process. With the application shall be furnished such information as required by the Engineer to demonstrate that the article, material, apparatus, product or process he wishes to use is the equivalent of that specified in quality, finish, design, efficiency and durability and has been elsewhere demonstrated to be equally serviceable for the purpose for which it is intended. The Contractor shall set forth the reasons for desiring to make the substitution and shall further state what difference, if any, will be made in the construction schedule and the contract price for such substitution should it be accepted; it being the intent hereunder that any savings shall accrue to the benefit of the County.

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- B. If the Engineer shall reject any such desired substitution as not being the equivalent of that specifically named in the contract, or if it shall determine that the adjustment in price in favor of the County is insufficient, the Contractor shall immediately proceed to furnish the designated article, material, apparatus, product or process.
- C. Request for substitutes must be proposed to the Commissioner on the "Request For Approval Of Substitution" form of the Sample Forms. Such requests shall conform to the requirements of this Article.
- D. Requests for substitutions shall include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the County.
- E. Requests for utilization of substitutes will be reviewed during the course of the project. The impact on the project and the timeliness of submission will be of key consideration.
- F. The approval of utilization of a substitute is subject to the sole and final discretion of the Engineer.
- G. REVIEW PROCESS
 - 1) Requests for approval of substitutions will be received and considered from Prime Contractors only and not from manufacturers, suppliers, Subcontractors, or other third parties.
 - 2) If the materials and equipment submitted are offered as substitutions to the Contract Documents or approved equal the Contractor shall advise the County and the Engineer of the requested substitutions and comply with the requirements hereinafter specified in this Article.
 - 3) Where the acceptability of substitution is conditioned upon a record of satisfactory operation and the proposed substitution does not fulfill this requirement, the Engineer, at his/her sole discretion, may accept the substitution if the Contractor provides a bond or cash deposit which guarantees replacement at no cost to the County for any failure occurring within the specified time. The substitution item must meet all other technical requirements contained in the Specification.
 - 4) The Contractor shall furnish such information as required by the Engineer to demonstrate that the equal article, material, apparatus, product or process is the equivalent of that specified in quality, finish, design, efficiency and durability and has been elsewhere demonstrated to be equally serviceable for the purpose for which it is intended and/or that it offers substantial benefits to the County in saving of time and/or cost. The Contractor shall set forth the reasons for desiring to make this substitution.
 - 5) Contractor shall submit:
 - a. For each proposed request for approved substitute sufficient details, complete descriptive literature and performance data together with samples of the materials, where feasible, to enable the Engineer to determine if the proposed request for approval should be granted, including manufacturer's brand or trade names, model numbers, description of specification of item, performance data, test reports, samples, history of service, and other data as applicable.

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- b. Certified tests, where applicable, by an independent laboratory attesting to the performance of the substitute.
 - c. A list of installations where the proposed substitute equipment or materials is performing under similar conditions as specified.
- 6) Where the approval of a substitute requires revision or redesign of any part of Work, including that of other Contracts, all such revision and redesign, and all new drawings and details required therefore, shall be provided by the Contractor at its own cost and expense, and shall be subject to the approval of the Engineer.
- 7) In the event that the Engineer is required to provide additional engineering services, then the engineer's charges for such additional services shall be paid by the Contractor to the County.
- 8) Any modifications in the Work required under other contracts to accommodate the changed design will be incorporated in the appropriate contracts and any resulting increases in contract prices will be charged to the Contractor by the County who initiated the changed design.
- 9) In all cases the Engineer shall be the judge as to whether a proposed substitute is to be approved. The Contractor shall be bound by his/her decision. No substitute items shall be used in the Work without written approval of the Engineer.
- 10) In making request for approval of substitute, Contractor represents that:
- a. Contractor has investigated proposed substitute, and determined that it is equal to or superior in all respects to the product, manufacturer or method specified or offers other specified advantages to the County.
 - b. Contractor will provide the same or better warranties or bonds for proposed substitute as for product, manufacturer or method specified.
 - c. Contractor waives all claims for additional costs or extension of time related to proposed substitute that subsequently may become apparent.
 - d. 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 a substitute proposed by the Contractor or by reason of failure of the Engineer to approve a substitute proposed by the Contractor. Any delays arising out of consideration, approval, or utilization of a substitute shall be the sole responsibility of the Contractor requesting the substitute and it shall arrange its operations to make up the time lost.
- 11) Proposed substitute will not be accepted if:
- a. Acceptance will require substantial revision of Contract Documents.
 - b. They will substantially change design concepts or Technical Specifications.
 - c. They will delay completion of the Work, or the Work of other Contractors.
 - d. They are indicated or implied on a Shop Drawing and are not accompanied by a formal request for approval of substitute from Contractor.
- 12) The Engineer reserves the right to disapprove, for aesthetic reasons, any material or

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equipment on the basis of design or color considerations alone, without prejudice to the quality of the material or equipment, if the manufacturer cannot meet the required colors or design.

- 13) All requests for approval of substitutes of materials or other changes from the contract requirements, shall be accompanied by an itemized list of all other items affected by such substitution or change. The Engineer shall have the right, if such is not done, to rescind any approvals for substitutions and to order such Work removed and replaced with Work conforming to the specified requirements of the contract, all at the Contractor's expense, or to assess all additional costs resulting from the substitution to the Contractor.
- 14) Approval of a substitute will not relieve Contractor from the requirement to submit Shop Drawings or any of the provisions of the Contract Documents.
- 15) In the event that the Engineer is required to provide additional engineering services as a result of a request for approval of a substitute results in changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, or for evaluation of deviations from Contract Documents, then the Engineer's charges in connection with such additional services shall be paid by the Contractor.
- 16) Structural design shown on the Drawing is based upon the configuration of and maximum loading for major items of equipment as indicated on the Drawings and as specified. If the substituted equipment furnished differs from said features, the Contractor shall pay to the County all costs of redesign and for any construction changes required to accommodate the equipment furnished, including the Engineer's charges in connection therewith.
- 17) The Contractor shall respond to required submittals with complete information and with a degree of accuracy to achieve approvals within two (2) submissions. All costs to the Engineer involved with subsequent submissions of Shop Drawings, Samples or other items requiring approval, will be paid by the Contractor to the County, by deducting such costs from payments due for Work completed. In the event an approved item is requested by the Contractor to be changed or substituted for, all costs involved in the reviewing and approval process will likewise be backcharged to the Contractor unless determined by the Engineer that the need for such substitution and/or deviation from Contract Documents is beyond the control of the Contractor.

30. EXTRA WORK: INCREASED COMPENSATION/DECREASED WORK: CREDIT TO THE OWNER

The Director of Project Management may, at any time, by a written order, and without notice to the sureties, require the performance of Extra Work or require or approve changes in the work, or Decreased Work ("work" to include but not be limited to specified methods of performing work) as he may deem necessary or desirable. The amount of compensation

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to be paid to the Contractor for any Extra Work, as so ordered, or credit to the Owner for such decreased work, as so ordered or approved, shall be determined as follows:

- 1) **First:** By such applicable unit prices, if any, as set forth in the Contract; or
- 2) **Second:** If no such prices are so set forth, then by unit prices or by a lump sum, or sums, mutually agreed upon by the Director of Project Management and the Contractor; or
- 3) **Third:** If, in the opinion of the Director of Project Management, the aforesaid unit prices, under "First" above, are not applicable, or if the two parties hereto cannot reach agreement as to new unit prices or a lump sum, or sums, under "Second" above, then by the actual net cost in money to the Contractor of the materials and of the wages of applied labor (including cost of supplements provided and premiums for Workmen's Compensation Insurance, FICA, and Federal and State Unemployment Insurance) required for such Extra Work, plus twenty (20%) percent as compensation for all items of profit and costs or expenses including administration, overhead, superintendence, insurance (other than those specifically noted above) materials used in temporary structures, allowances made by the Contractor to subcontractors, including those made for overhead and profit, additional premiums upon the performance bond of the Contractor and the use of small tools and any and all other costs and expenses not enumerated above, plus such rental for plant and equipment (other than small tools) required and approved for such extra work. Where extra work is performed by a Subcontractor, the twenty percent stipulated above shall be divided between the Contractor and the Subcontractor as per their contractual agreement, or if not defined therein, then as the Contractor sees fit.

Rental rates for any power operated machinery, trucks or equipment, which it may be found necessary to use as in "Third" above, shall be reasonable and shall be based on those prevailing in the area of the County where such work is to be done, and they shall be agreed upon in writing before the work is begun.

In no case shall the rental rates submitted exceed the rates set up in the current edition of "Equipment Watch" plus the cost of fuel and lubricants.

These rates shall include all repairs, fuel, lubricants, applicable taxes, insurance, depreciation, storage and all attachments complete, ready to operate, but excluding operators. Operators shall be paid as stated here in above for labor.

For equipment, which is already on the project, the rental period shall start when ordered to work by the Construction Administrator, and shall continue until ordered to discontinue by him. The minimum payment for any one rental period shall be four hours, unless otherwise agreed upon between the Construction Administrator and the Contractor.

For equipment which has to be brought to the project, specifically for use as in "Third" above, the County will pay all loading and unloading costs, also all transportation costs will not be paid, if the equipment is used for work other than in "Third" above while on the project. The rental period shall begin at the time the equipment has been unloaded on the

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project, and shall end on and include the day the order to discontinue the use of the equipment as in "Third" above is given to the Contractor by the Construction Administrator.

The daily rate shall apply for rental periods of four calendar days or less, the weekly rate shall apply for rental periods of more than four and not exceeding twenty-one calendar days, and the monthly rate shall apply for rental periods in excess of twenty-one calendar days. For fractional periods above the full unit rental period (day, week, month) reimbursement shall be proportioned on the basis of the applicable rental period. (Day-8 hrs.; Week-7 calendar days; Month-30 calendar days).

No percentage shall be added to the amounts of equipment rental prices agreed upon, but the price agreed upon shall be the total compensation allowed for the use of such equipment.

The provisions hereof shall not affect the power of the Contractor to act in case of emergency.

31. DISPUTED WORK - NOTICE OF CLAIMS FOR DAMAGES

If the Contractor is of the opinion that any work required, necessitated, or ordered violates or conflicts with or is not required by the terms and provisions of this Contract, it must promptly, within five (5) calendar days after being directed to perform such work, notify the Construction Administrator, in writing, of its contentions with respect thereto and request a final determination thereon. If the Construction Administrator determines that the work in question is contract and not extra work, or that the order complained of is proper, he will direct the Contractor in writing to proceed and the Contractor shall promptly comply. In order, however, to preserve its right to claim compensation for such work or damages resulting from such compliance, the Contractor must, within seven (7) calendar days after receiving notice of the Construction Administrator's determination and direction, notify the Construction Administrator, in writing that the work is being performed or that the determination and direction is being complied with, under protest. Failure of the Contractor to so notify shall be deemed as a waiver of claim for extra compensation or damages therefore.

While the Contractor is performing disputed work or complying with a determination or order under protest in accordance with this Article, in each such case the Contractor shall furnish the Construction Administrator daily with three copies of written statements signed by the Contractor's representatives at the site showing:

- 1) the name of each worker employed on such work or engaged in complying with such determination or order, the number of hours employed thereon, and the character of the work each is doing; and
- 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 order, and from whom purchased or rented.

It is expressly agreed that no dispute over the scope of the Contractor's work or any portion thereof shall cause any delay or interruption to the Contractor's work.

In addition to the foregoing statements, the Contractor shall, upon notice from the Board of Acquisition and Contract, produce for examination by the duly appointed representative of

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the Board of Acquisition and Contract, all its books of accounts, bills, invoices, payrolls, subcontracts, time books, daily reports, bank deposit books, bank statements, check books and canceled checks, showing all of its acts and transactions in connection with or relating to or arising by reason of this contract, and submit itself, its agents, servants and employees for examination under oath by any duly appointed representative designated by the Board of Acquisition and Contract to investigate claims made against the County. Unless the aforesaid statements shall be made and filed within the time aforesaid and the aforesaid records submitted for examination and the Contractor, its agents, servants, and employees submit themselves for examination as aforesaid, the County shall be released from all claims arising under, relating to or by reason of this contract, except for the sums certified by the Construction Administrator to be due and agreed that no person has power to waive any of the foregoing provisions, and that in any action against the County to recover any sum in excess of the sums certified by the Construction Administrator to be due under or by reason of this contract, the Contractor must allege in its complaint and prove, at the trial, strict compliance with the provisions of this article.

Before final acceptance of the work by the County, all matters of dispute must be adjusted to the mutual satisfaction of the parties thereto. Determinations and decisions in case any question shall arise, shall constitute a condition precedent to the right of the Contractor to receive the money therefore, until the matter in question has been adjusted.

32. CONTRACTOR'S SUBCONTRACTS AND MATERIAL LISTS

Within fifteen (15) days after execution of the Contract, the successful bidder shall submit to the County for approval a list of the subcontractors, materialmen and materials that he/she plans to use in the performance of the work and statements of the work they are to perform. The format and content of the list shall be in accordance with directives from the Construction Administrator. He/sit shall also submit additional information regarding their qualifications as may be later requested by the County. No part of the work may be sublet until after the Contractor has received the County's approval.

The Contractor shall be fully responsible for all acts and omissions of its subcontractors and persons directly or indirectly employed by them, and the County's approval to sublet parts of the work will in no way relieve the Contractor of any of its obligations under the Contract. All dealings of the Construction Administrator with the subcontractors shall be through the Contractor, subcontractors being recognized by the County only as employees of the Contractor.

By executing the Agreement, the Contractor represents that the Contractor shall insert appropriate clauses in all subcontracts to bind the subcontractors to the Contractor by all applicable provisions of the Contract Documents executed between the Contractor and the County, but this shall not be construed as creating any contractual relationships between subcontractors and the County. Prior to approval of the subcontractors, the County has the right to review and recommend changes in the subcontracts. The County reserves the right to reject any subcontractor proposed by the Contractor if in the reasonable opinion of the County such subcontractor lacks the experience, capability or integrity to perform its subcontract work or is otherwise non-responsible.

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By executing the Agreement, the Contractor represents that the Contractor shall insert appropriate clauses in each subcontract that require that if the Contractor is terminated by the County either for default or convenience that at the sole option of the County the subcontract shall automatically attach to the County and the subcontractor shall continue without delay or interruption to fully perform all of the obligations required by its subcontract.

Where the specifications permit the Contractor a choice of different materials or manufactured products, it shall state the choice he has made in making up its bid, with the understanding that all choices must subsequently be approved by the Commissioner, after award of the contract to the successful bidder. If the bidder wishes to propose utilization of materials or manufactured products other than those specified, it shall so state and submit the required information in accordance with Article "Request For Approval Of Equal" of the General Clauses."

33. ASSIGNMENT OF CONTRACT

The Contractor shall not assign, transfer, convey or otherwise dispose of the contract or any part of it or any monies due and payable under the contract, without prior written approval of the County. If such approvals are granted by the County, they shall in no way relieve the Contractor or from any obligations under the terms of this Contract.

All documents assigning the contract or any part of it or any monies due and payable under the contract shall contain a clause stating that all monies to be paid the assignee in accordance with the terms of the Contractor's contract with the County, are subject to a prior lien for services rendered or materials and equipment supplied, in favor of all persons, firms or corporations rendering such services or supplying such materials and equipment.

34. PAYMENT FOR GENERAL PROVISIONS

No direct payment will be made for work done or materials furnished in compliance with the General Provisions of the specifications, unless otherwise noted. All compensation to the Contractor for its performance of the requirements of any general provision shall be considered to have been included in the prices he has bid for the individual items if a unit price contract and/or for a lump sum price if a lump sum contract.

In the event the Contractor fails or refuses to proceed with its work and/or correct or repair deficient or defective work then without prejudice to any and all of the County's other rights and remedies, and upon three (3) days notice to Contractor, the County may perform and/or employ any other person or persons to correct and/or repair any or all such work. All costs incurred by the County pertaining thereto shall be paid forthwith by the Contractor to the County.

35. COSTS INCURRED BY COUNTY

Wherever in these Contract Documents the County is entitled to recover costs from the Contractor or charge the Contractor for the costs incurred for the correction, supervision or for any other reason related to the Contractor's work or arising from the Contractor's failure or refusal to proceed with its work in a timely manner, such costs and/or charges shall be

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deemed to include, but not be limited to, the County's costs and fees for inspection(s), engineering, consultant(s) and attorneys.

36. GUARANTEE OF WORK

- A. Except as otherwise specified, all work performed under the Contract shall be guaranteed by the Contractor against defects resulting from the use of inferior materials, equipment or workmanship for one year from the guarantee starting date (which shall be defined as the date of the County's approval of the final Certificate for Payment or the date of actual full occupancy of the building, whichever is earlier). The building, section thereof, or item of equipment, shall be occupied or put into actual use by the Owner only after judged completed by the Construction Administrator and Owner and approved by him as ready for occupancy.
- B. If, within any guarantee period, repairs or changes are required in connection with guaranteed work, which in the opinion of the Construction Administrator or Owner is rendered necessary as a result of the materials, equipment or workmanship which are inferior, defective, or not in accordance with terms of the Contract, the Contractor shall promptly upon receipt of notice from the Construction Administrator or Owner and without expense to the Construction Administrator or Owner:
 - 1) Place in satisfactory condition, in every particular, all of such guaranteed work, correct all defects thereof, and
 - 2) Make good all damages to the building or site, or equipment or contents thereof, and
 - 3) Make good any work or material, or equipment and contents of said building or site disturbed in fulfilling any such guarantee.
- C. In any case where in fulfilling requirements of the Contract or of any guarantee embraced in or required thereby the Contractor disturbs any work, it shall restore such disturbed work to a condition satisfactory to the Construction Administrator.
- D. If the Contractor, after notice, fails to proceed promptly to comply with terms of its guarantee, the Owner may have the defects corrected and the Contractor shall be liable for all expenses incurred.
- E. All special guarantees applicable to definite parts of the work that may be stipulated in the Specifications or other papers forming a part of the Contract shall be subject to the requirements and term of this article.

37. SEPARATE CONTRACTS

- A. Contractor's attention is specifically directed to the fact that, because of the work of other contracts within and adjacent to the limits of this Contract they may not have exclusive occupancy of the territory within or adjacent to the limits of this Contract.
- B. Contractor's attention is further directed to the fact that, during the life of this Contract the owners and operators of Public Utilities may make changes in their facilities. These changes may be made by the Utility employees or by contract within the limit or adjacent to these contracts and may be both temporary and permanent.

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- C. Contractor shall be required to cooperate with other contractors and the owners of the various utilities, and to coordinate and arrange the sequence of their work to conform to the progressive operations of the work already under contract and to be put under contract.
- D. Contractor shall be responsible for the coordination of the work of their various subcontractors. Their respective operations shall be arranged and conducted so that delays will be avoided. Where the work of a subcontractor overlaps or dovetails with that of other subcontractors, materials shall be delivered and operations conducted so as to carry on the work continuously in an efficient and workmanlike manner. Delays or oversights on the part of Contractor or its subcontractors or utility owners in getting any or all of their work done in the proper way thereby causing cutting, removing and replacing work already in place, shall not be the basis for claim for extra compensation.
- E. In case of interference between the operations of the utility owners and different Contractors, the Construction Administrator will be the sole judge of the rights of each Contractor and the sequence of work necessary to expedite the completion of the entire project, and in all cases the Construction Administrator's decision shall be accepted as final and may not be challenged except in a proceeding brought pursuant to Article 78 of the Civil Practice Law and Rules.

38. COOPERATION WITH OWNER

Each Contractor shall cooperate with the Owner as to parking of vehicles, availability of storage and working areas and confining of activities and personnel to same. **NO PARKING FOR CONTRACTOR'S EMPLOYEES.**

39. JOB MEETINGS & PROJECT SUPERINTENDANT

- A. An officer of the Contractor, or its project manager or superintendent, who is fluent in English and authorized to make binding decision on behalf of the Contractor shall attend job meetings with the Commissioner and/or the Construction Administrator, and any subcontractors whom the Inspector may designate; for the purpose of discussing expedition, execution and coordination of the work.
- B. Job meetings will be scheduled periodically (the first to be prior to commencement of construction) at a time and place designated by the Construction Administrator.
- C. The Contractor shall not commence any work prior to the first (pre-construction) meeting between the Contractor, Commissioner and/or Construction Administrator, client, and other concerned governmental and utility company representatives.
- D. At the pre-construction meeting, the scheduling of the work on an arrow-flow diagram (showing chronologically and in detail the sequence and methods that will be followed) will be provided, and details for the proper execution and special requirements of the work will be explained and discussed.
- E. The Contractor shall be responsible for providing a detailed construction schedule that provides for a Critical Path Method ("CPM") and which is compatible with any of the state of the art CPM Method scheduling software.

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- F. Updated coordinated arrow-flow diagrams or CPM schedules, as the case may be, will be provided by the Contractor, as above, on a monthly basis to the County.

The Contractor shall indicate on the construction schedules noted above, time for shop drawing preparation, approvals, fabrication and delivery of materials and equipment for major items. The County may request that additional important items be included on the schedule.

- G. The Contractors shall ensure that its Project Superintendent shall be on site full time at all times when the Contractor's Work is being performed.

40. PATENT WARRANTY

- A. Contractor expressly represents, warrants and agrees that he has the legal right to furnish and install and to authorize the County to purchase and use the equipment hereby offered and each and every one of its several parts and every feature thereof, under one or the other, or partly under one and partly under the other of the following representations.
- 1) That the Contractor possesses a valid patent(s) covering the equipment to be furnished hereunder or part or features thereof or has or will obtain permit(s) and license(s) authorizing the Contractor to furnish and install same and to authorize the purchase and use thereof by the County.
 - 2) The Contractor is responsible before ordering material, equipment, parts, systems, etc, to verify that the suppliers of all such material, equipment, parts, systems, etc, will supply the required warranty, guarantee, O & P manual, and maintenance service schedule.
 - 3) That the equipment offered or certain parts or features thereof are not covered by any valid patent(s) within the knowledge of the Contractor.
- B. Contractor further warrants and agrees that if any patent(s) is hereafter issued to any person whatsoever with respect to the equipment or any part or features thereof, to be furnished and installed hereunder, the Contractor will obtain such permit(s) or license(s) from the Patentee as may be necessary to authorize the use of the equipment by the County.
- C. Contractor further represents, warrants and agrees that he and its sureties shall hold themselves responsible for and defend any claims made against the County for any infringement of patents due to the purchase and use by the County of said equipment or any part or feature thereof; that they will indemnify and save harmless the County from all costs, expenses and damages which it shall be obliged to pay by reason of any such infringement of patent(s); that in case the use of any such equipment is enjoined, they will bear the expenses of removing same and replacing same with equipment which will satisfactorily perform the function without constituting an infringement of any patent(s); and in case the use of any equipment shall be enjoined, that they shall pay to the County the sum of \$1,000.00 per day, as liquidated damages, for each and every day during which the County shall be enjoined from using the same up to the day on which such

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equipment is replaced by other equipment which will satisfactorily perform the same function but which will not constitute an infringement of any other patent(s).

- D. The Contractor further agrees in the event the use of any of the equipment is enjoined and the Contractor is unable within a reasonable time to devise other equipment which will satisfactorily perform the same functions without infringement on any patent(s), that he will remove the equipment and refund to the County the entire cost of its purchase and installation, plus the sum of \$ 1,000.00 per day as liquidated damages for each and every day until the substitute equipment has been purchased and installed by the County, excepting however that such period shall not exceed three months.
- E. The Contractor further agrees in the event that any claim or notice of claim for infringement of patent(s) are made or filed prior to the making of payment by the County for the equipment and/or material proposed to be furnished and installed hereunder, that the County may withhold any sum due to the Contractor for such equipment and/or material until such claims shall have been settled or adjudicated or until additional surety bonds or other guarantees of indemnification shall have been posted, if deemed necessary by the County for its protection.

41. MATERIALS

A. Quality

- 1) It is the intent of these Specifications to describe definitely and fully the character of materials and workmanship required with regard to all ordinary conditions of the work and to require first-class work and new and best quality materials in all particulars. For unexpected conditions arising during the progress of the work and not fully covered herein, the Specifications shall be interpreted by the Construction Administrator to require first-class work and materials and such interpretations shall be accepted by the Contractor.
- 2) The Contractor is responsible before ordering material, equipment, parts, systems, etc, to verify that the suppliers of all such material, equipment, parts, systems, etc, will supply the required warranty, guarantee, O & P manual, and maintenance service schedule.
- 3) Where materials or devices are specified in these documents by reference to government, manufacturer's association, or professional society standards, the pertinent sections of the latest edition of such standards shall have the same force and effect as if set forth in full in these Specifications. The following abbreviations shall be used as indicated for the principal societies:

AASHO	American Association of State Highway Officials
ACI	American Concrete Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute

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ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWI	American Woodworking Institute
AWS	American Welding Society
BHMA	Builders Hardware Manufacturers Association
CS	Commercial Standards
FS	Federal Specifications
IEEE	Institute of Electrical and Electronic Engineers
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
SDI	Steel Deck Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Incorporated
TCA	Tile Council of America, Incorporated
TMCA	Tile and Marble Contractors of America
UL	Underwriter's Laboratories, Incorporated

B. Delivery, Storage and Handling:

- 1) Materials shall be delivered in manufacturer's original sealed containers with complete identification of contents and manufacturer, and kept sealed in original containers until used. Labels shall not be removed until materials have been installed and inspected.
- 2) Materials shall be delivered, stored, and handled with proper equipment and in a manner to protect them from damage.
- 3) The Contractor shall make arrangements for the receipt of materials delivered to the construction site. No representative of the County will accept any materials ordered by the Contractor.
- 4) Finish materials shall be protected from dirt and damage, and perishable materials shall be stored within appropriate weatherproof enclosures.
- 5) Delivery of materials shall be coordinated with the Operations Schedule.
- 6) The Contractor shall confine the apparatus, the storage of materials and the operations of the workmen to the limits indicated by law, ordinances, permits, or directions of the Construction Administrator, and shall not encumber the premises beyond the contract limits.

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- 7) The Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.
- 8) Whenever the Contract Documents require delivery by the Contractor of any materials, equipment, or other items, the term delivery shall be deemed to include unloading and storing with proper protection where directed.

C. Federal Regulations

- 1) Should the Federal Government, because of Declaration of an Emergency, or other cause, establish controls over the use of certain construction materials, then the Contractor, immediately after signing the Contract or immediately after Declaration of an Emergency, shall furnish the Commissioner with an itemized list of all critical materials required for use on the project. For each item, the quantity required and the approximate date on which delivery will be required shall be indicated.

D. Name Plates

- 1) Each piece of operable equipment to be furnished and installed by a Contractor under its Contract such as motors, pumps, heaters, fans, transformers, switch and fuse racks and other similar equipment shall be provided with a substantial name plate of non-corrodible metal securely fastened in place and clearly and permanently inscribed with the manufacturer's name, the model or type designation, the serial number, the principal rated capacities, the electrical or other power characteristics and other similar and appropriate information.
- 2) Manufacturer's identification shall be inconspicuous, but where nameplates contain information relative to characteristics or maintenance, they shall be clearly visible and located for easy access.
- 3) The nameplate of a subcontractor or a distributor will not be permitted.

E. Manufacturer's Certification

- 1) Prior to the delivery of any water or sewer pipe to the construction site, the Contractor shall furnish properly attested documents certifying as to the type, class, name of manufacturer and source of supply of the pipe. One copy of each document shall be forwarded to the Construction Administrator at the construction site and to the Director of Project Management care of the Engineering Division, Michaelian Office Building, White Plains, New York.

F. Samples

- 1) The Contractor shall furnish, for approval of the Engineer, any samples required by the specifications or that may be requested by the Owner, of all materials he proposes to use, and shall pay all shipping charges for the samples. The Contractor shall send all samples to the office of the Engineer, except when directed otherwise. The sample of approved material will remain on file in the Engineer's office. A disapproved sample will be returned to the Contractor.
- 2) No samples are to be submitted with bids.
- 3) No materials or equipment of which samples are required to be submitted for

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approval shall be used on the work until such approval has been given by the Engineer or Construction Administrator, save only at the Contractor's risk and expense.

- 4) Each sample shall have a label indicating the material represented, its place of origin and the names of the producer, the Contractor and the Contract for which the material is intended.
- 5) Approval of any sample shall be only for characteristics or for uses named in such approval, and no other. No approval of a sample shall be taken in itself to change or modify any Contract requirement. When a material has been approved, no additional sample of that material will be considered and no change in brand or make will be permitted. Approved samples held by the Engineer will be returned to the Contractor upon completion of the work, if requested.
- 6) Transactions with manufacturers or subcontractors shall be through the Contractor.

G. Dissimilar Materials

- 1) Where metals are placed in contact with or fastened to dissimilar metals, concrete, masonry, wood or other absorptive materials subject to repeated wetting or wood treated with a preservative non-compatible with the metal or if drainage from dissimilar materials passes over the work; treat the contact surfaces with a heavy coat of approved alkali-resident bituminous paint.
- 2) Where one of the metals is aluminum, a coat of zinc-chromate primer shall be applied prior to the bituminous paint.

42. STANDARD OF QUALITY

Wherever in the contract documents an article, material, apparatus, device, product or process is called for by trade name or catalog reference, or by the name of the patentee, manufacturer or dealer, it shall be construed as establishing a standard of quality and not construed as limiting competition. In such instances, the Contractor may use any article, material, etc. which, in the judgment of the Engineer, expressed in writing, is equal to and acceptable for the intent specified.

43. PROPRIETARY ITEM

Whenever less than three names are used in proprietary item specifications, it has been determined that:

- A. The use of trade names is necessary for effective and workable specifications for the item.
- B. All manufacturers known by the individuals familiar with the trade involved have been listed.
- C. Equal items may be approved in accordance with Article "Request For Approval Of Equal" of the General Clauses.

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44. SHOP DRAWINGS

A. Shop Drawing Schedule

- 1) Within fifteen (15) days after the Notice to Proceed, the Contractor shall prepare and submit two (2) copies of its schedule of Shop Drawing submissions to the Engineer for review and approval. The schedule is to be submitted on the “Shop Drawing Schedule” form of the Sample Forms.
- 2) In order to maintain the construction schedule for this project the Contractor shall submit all Shop Drawings per approved schedule. The Contractor is expressly cautioned that its failure or refusal to timely submit a shop drawing schedule acceptable to the Engineer and/or any deviation from the approved shop drawing schedule shall be deemed a default under this Contract.
- 3) Shop Drawings shall be submitted without fail in time to permit correction, resubmission and final approval, as hereinafter specified, without causing any delay in the construction of any Work.
- 4) Samples and Shop Drawings, which are related to the same unit of Work or Specification Section, shall be submitted at the same time. If related Shop Drawings and Samples are submitted at different times, they cannot be reviewed until both are furnished to the Engineer.
- 5) The schedule shall be updated every four-(4) weeks or more frequently as required by the Engineer.
- 6) Two (2)-updated copies of the schedule shall be submitted to the Engineer with each application for Partial Payment.
- 7) Form of Schedule

Schedule shall be in tabular form with appropriate spaces to insert the following information for principal items of equipment and materials:

- a. Date on which Shop Drawings are requested and received from the manufacturer.
- b. Dates on which Shop Drawings are transmitted to the Engineer by the Contractor.
- c. Dates on which Shop Drawings are returned by the Engineer for revisions.
- d. Dates on which Shop Drawings are revised by manufacturer and resubmitted to the Engineer.
- e. Date on which Shop Drawings are returned by Engineer annotated either “Approved” or “Approved as Noted”.
- f. Date on which accepted Shop Drawings are transmitted to manufacturer and Contractor’s Invoice Number.
- g. Date of manufacturer’s scheduled delivery.
- h. Date on which delivery is actually made.

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- i. Sample of schedule follows on next page.

B. Shop Drawing Requirements

- 1) Shop Drawings for the Work shall include working and setting drawings, schedules, shop details, wiring diagrams, manufacturer's catalog cuts and brochures and all other drawings, schedules and diagrams necessary for the proper correlation of the Work.

Insofar as it is practicable, all drawings shall be uniform in size. They shall be dated, numbered consecutively and shall be identified with the Contract Number and Title, a description of the material or equipment and the area of the work and where it is to be installed. Shop drawings shall accurately and clearly show sizes, work, erection dimensions, arrangement and sectional views, necessary details including information for making connection with the work of other items as may be required, materials and finishes, detailed parts lists, and performance characteristics and capacities as may be required.

- 2) All detailing for structural components shall be done in accordance with the provisions for design and workmanship in the latest additions of the publications listed below except as may be modified in the Contract Documents:

- a. "Manual of Steel Construction" of the American Institute of Steel Construction.
- b. "Building Code Requirements for Reinforced Concrete" and "Manual of Standard Practice for Detailing Reinforced Concrete Structures" of American Concrete Institute.

- 3) Detailing practices for other components shall be done to conform to the best trade practices.

4) Contractor Responsibilities

- a. Before submitting Shop Drawings to the Engineer all submittals from its Subcontractors, manufacturers or suppliers shall be sent directly to the Contractor for preliminary review, coordination and checking.

Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of material or equipment. Contractor shall thoroughly check all drawings for accuracy and conformance to the intent of the Contract Documents. Drawings found to be inaccurate or otherwise in error shall be returned to the Subcontractors, manufacturers, or suppliers by the Contractor for correction.

- b. All submittals, including Shop Drawings prepared by or under the direction of the various Contractors, shall be thoroughly checked by the Contractor for accuracy and checked by the Contractor for accuracy and conformance to the intent of the Contract Documents before being submitted to the Engineer and shall bear the Contractor's signature certifying that they have been so checked. Before submitting them to the Engineer, all submittals shall be properly labeled and consecutively numbered. In a clear space above the title block, the Contractor shall provide the "Shop Drawing ID" form of the Sample Forms, and enter the required information:

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- c. Shop Drawings shall be submitted as a single package including all associated drawings for any operating system and shall include all items of equipment and any mechanical units involved or necessary for the functioning of such system. Where applicable, the submittal shall include elementary wiring diagrams showing circuit functioning and necessary interconnecting wiring diagrams for construction.
- d. If the submittals contain any departures from the Contract Documents, specific mention thereof shall be made in the Contractor's letter of transmittal. Otherwise, the review of such submittals shall not constitute approval of the departure. The Contractor shall also call the Engineer's attention to any changes by the use of larger letters of at least 1" in height on the Shop Drawings along with a letter by the Contractor advising the Engineer to the recommended change and the reason therefore. If this is not done, even if the Work is incorporated in the construction, it will not be accepted by the Engineer even if Shop Drawings are "Approved".
- e. No materials or equipment shall be ordered, fabricated or shipped or any Work performed until the Engineer returns to the Contractor the submittals herein required, annotated "Approved".
- f. Where errors, deviations, and/or omissions are discovered at a later date in any of the submittals, the Engineer's prior review of the submittals does not relieve the Contractor of the responsibility for correcting all errors, deviations and/or omissions.
- g. Two (2) copies of Preliminary Operations and Maintenance Manuals shall be submitted with the final Shop Drawings for each item of equipment.
- h. Submittals shall be transmitted in strict compliance with Special Clause 10. A.2 and in sufficient time to allow the Engineer adequate time for review and processing so as not to delay the Project per the approved Shop Drawing Schedule.
- i. Contractor shall transmit five (5) prints of each submittal to the Engineer for review. Any submissions, which in the opinion of the Engineer, are not legible will not be reviewed and will be returned to the Contractor annotated "Disapproved".
- j. Contract drawings are for engineering and general arrangement purposes only and are not to be used as Shop Drawings.
- k. Shop Drawings shall accurately and clearly present the following:
 - All working and installation dimensions.
 - Arrangement and sectional views.
 - Units of equipment in the proposed positions for installation, details of required attachments and connections, and dimensioned locations between units and in relation to the structures.
 - Necessary details and information for making connections between the

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various trades including, but not limited to, power supplies and interconnecting wiring between units, accessories, appurtenances, etc.

- l. Structural and all other layout drawings prepared specifically for the Project shall have a plan scale of not less than 1/4-inch equal to 1 foot and they shall be not larger than the size of the Contract Drawings.
 - m. Where manufacturer's publications in the form of catalogs, brochures, illustrations, compliance certificates, or other data sheets are submitted in lieu of prepared Shop Drawings, such submissions shall specifically indicate the item for which approval is requested. Identification of items shall be made in ink, and submissions showing only general information are not acceptable.
 - n. The Contractor shall provide all required copies for the use of the various trades and at the Site, and one (1) copy of approved Shop Drawings shall be provided by the Contractor to each of the other Prime Contractors unless otherwise noted in writing by the Engineer.
 - o. The Contractor shall respond to required submittals with complete information and accuracy to achieve required approvals within three (3) submissions. All costs to the Owner involved with subsequent submissions of Shop Drawings, Samples or other items requiring approval, will be backcharged to the Contractor, at the rate of 3.0 times direct technical labor cost, by deducting such costs from payments due for Work completed. In the event an approved item is requested by the Contractor to be changed or substituted, all involved costs in the review process will likewise be paid by the Contractor to the County unless determined by the Director of Project Management or Commissioner that the need for such deviation is beyond the control of the Contractor. Contractor shall be responsible for coordinating its Work and submittals with its Subcontractors.. Should Contractor cause the need for additional submissions or reviews of previous submissions all involved costs will similarly be paid to the County.
- 5) Procedure for Review
- a. Shop Drawings will be checked for design conformance with the Contract Documents and general arrangement only.
 - b. Submittals will be annotated by the Engineer in one of the following ways:
 - "Approved" - no exceptions are taken.
 - "Approved as Noted" - minor corrections are noted and shall be made and a resubmittal is required.
 - "Disapproved because" - with specific deficiencies noted.
 - "Disapproved" - based on the information submitted, the submission is not in conformance with the Contract Documents. The deviations from the Contract Documents are too numerous to list and a completely revised submission of the proposed equipment or a submission of other equipment is required.

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c. One copy of the reviewed submittals will be returned to the Contractor. It is the Contractor's responsibility to provide copies to:

- Its Subcontractors.
- Its Materialmen and Suppliers.

unless notified otherwise in writing by the Engineer.

- 6) Disapproved drawings will be returned to the Contractor for correction and resubmission. After the Contractor has had the required corrections made on the original drawing, it shall again submit five copies for review by the Engineer.
- 7) The acceptance of Shop Drawings by the Engineer shall be only general in nature and shall not relieve the Contractor of any responsibility for the accuracy of the drawings, the proper fitting and construction of the Work or for the furnishing of materials or other Work required by the Contract Documents, but not shown on the Shop Drawings. Acceptance of Shop Drawings by the Engineer shall not be construed as approving departures from the Contract requirements unless specifically noted by the Engineer. Acceptance of Shop Drawings for one item shall not be construed as approval for other changes even if noted by the Contractor on the drawing.
- 8) Shop Drawings submitted other than in accordance with the outlined procedures will be returned to the Contractor for resubmission and the Contractor shall bear all expense and risk of all delays as if no Shop Drawings had been submitted.
- 9) No Work shall be performed until the Shop Drawings have been accepted by the Owner, and the Contractor shall be responsible for all costs and damages, which may result from proceeding prior to the approval of the Shop Drawings.

45. SEQUENCE OF CONSTRUCTION OPERATIONS

- A. It is mandatory that the premises continue to be occupied and facilities therein shall continue to function during the performance of the construction work.
- B. Detailed sequence of construction and availability of spaces in areas through which services must pass shall be coordinated between the Owner and the Contractor, before actual commencement of the Work.
 - 1) To enable the Work to be laid out and prosecuted in an orderly and expeditious manner, Contractor shall provide a proposed Progress Schedule, within fifteen (15) days after the issuance of the Notice to Proceed of this Contract unless otherwise directed in writing by the Construction Administrator. The proposed Progress Schedule shall show the anticipated time of commencement and completion of each of the various operations to be performed under this Contract; together with all necessary and appropriate information regarding the sequence and correlation of Work; and the Schedule of Shop Drawings and delivery of all materials and equipment required for the Work. The Contractor shall prepare a Master Progress Schedule (Schedule) for the Work. Contractor as directed by the Construction Administrator shall revise the proposed Schedule until each activity is properly sequenced to provide that the Work will be completed in the proper order and

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within the allotted Contract duration, without any conflicts. When the Construction Administrator has accepted the Schedule the Contractor will sign it. The Contractor shall then provide one (1) copy of such approved Schedule to each Subcontractor and two (2) copies to the Construction Administrator. Contractor shall afford its Subcontractors a reasonable opportunity for the introduction and storage of their materials and the execution of their Work and shall properly connect and coordinate its Work with others.

Contractor shall strictly adhere to the Schedule unless changed as provided for in the following paragraph.

- 2) Within five (5) days after receiving notice of any change in the Contract, or of any Extra Work to be performed, or of any suspension of the whole or any portion of the Work, or of any other conditions which are likely to cause or are actually causing delays, Contractor must notify the Construction Administrator in writing of the effect, if any, of such change or Extra Work or suspension or other condition upon the previously approved schedule, and must state in what respects, if any, the Schedule should be revised, with the reasons therefor. These proposed changes in the Schedule shall be reviewed and, if appropriate, approved, in writing, by the Construction Administrator. Contractor must strictly adhere to the revised Schedule. Distribution of the revised Schedule shall be as described in paragraph B-1 above. Contractor's compliance with the requirements of this paragraph is in addition to, and not in lieu of, compliance with other notice requirements pertaining to delays and extensions of time contained elsewhere in the contract.
 - 3) The Schedule shall be reviewed by Contractor every two (2) weeks or as directed by the Construction Administrator.
 - 4) If Contractor shall fail to adhere to the approved Schedule, or to the Schedule as revised, they must promptly adopt additional means and methods of construction with no additional cost to the County that will make up for the lost time and will assure completion in accordance with such Schedule. The proposed means and methods shall be described in writing to the County within two (2) days after the Contractor discovered or should have reasonably discovered that the Schedule would not be met as originally proposed. Failure to comply with this requirement may result in the County enforcing its rights under the Contract including, without limitation, default of the Contract.
- C. From time to time as the Work progresses and in the sequence indicated by the approved Schedule, the Contractor must submit to the Construction Administrator a specific request in writing for each item of information or approval required. These requests shall be submitted sufficiently in advance of the date upon which the information or approval is actually required by the Contractor to allow for the time the Construction Administrator may reasonably take to act upon such submissions or resubmissions. The Contractor shall not have any right to an Extension of Time on account of delays due to its failure to timely submit requests for the information or approvals.
- D. Certain construction work shall be required, which will be disruptive to the Owner's staff insofar as noise, dirt and dust is concerned. The Contractor, therefore, shall

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perform such work during other than normal working hours. Subject to the requirements of law, the Owner imposes no limitation on the Contractor's working hours and whatever overtime work may be necessary or required shall be considered by the Contractor and reflected in its Bid Proposal without the benefit of extra compensation.

46. PROTECTION

- A. The Contractor shall at all times exercise all necessary precautions for the safety of the public, employees performing the work and County personnel. The Contractor shall provide and maintain barricades, danger signals and other safeguards about the work and shall be held responsible for all accidents or damages to persons or property caused by failure to do so throughout the progress of the work, and shall comply with all applicable provisions of Federal, State and County Safety Laws.
- B. The Contractor shall during the performance of its work, protect at all times all adjacent portions of the existing surfaces and existing equipment from damage due to the performance of the construction work.
- C. The Contractor shall furnish temporary facilities and/or temporary dust-proof partitions separating all work areas and access routes from those areas not involved in active alterations, so that this work will not interfere with the Owner's access or normal use of areas not allocated to the Contractor, or any essential service to such areas, when ordered by the Construction Administrator.

47. CLEANUP AND REMOVAL OF DEBRIS

- A. At the end of each working day, the Contractor shall sweep up and collect all the rubbish and place it in appropriate containers, furnished by the Contractor. Containers shall be kept at a location on, or adjacent to the work site, as designated by the Construction Administrator. Wood or cardboard crates and other debris of a similar nature shall be broken up, securely bundled and neatly stacked alongside the containers. Once each week and at the completion of the work, the Contractor shall remove all accumulated debris and rubbish.
- B. At the completion of the work, the Contractor shall clean all equipment, fixtures, surfaces and accessories, removing all dust and other foreign matter, ready for use by the Owner.

48. TEMPORARY SERVICE

- A. Sanitary facilities will be provided by the Owner for the Contractor and its personnel.
- B. The Owner will supply and pay for the cost of all-temporary water and temporary electric power (120 volt, 60 hertz). The Contractor shall furnish and install all temporary electrical and water connections required for work under this Contract, at and to locations as designated by the Construction Administrator.

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49. OPERATING TESTS

- A. Where operating tests are specified the Contractor shall test the work as it progresses and shall make satisfactory preliminary tests in all cases before applying to the Engineer for official tests.
- B. Official tests will be made in the manner specified for the different branches of the work, in the presence of the Construction Administrator or Engineer. Should defects appear they shall be corrected by the Contractor and the test repeated until the installation is acceptable to the Construction Administrator or Engineer and to any authorities having jurisdiction.
- C. No work of any kind shall be covered or enclosed before it has been tested and approved.
- D. The Contractor shall furnish all materials and apparatus, make connections and conduct tests, without extra compensation unless noted otherwise.

50. OPERATING INSTRUCTIONS AND PARTS LISTS

- A. Where the Specifications require any Contractor to supply equipment operating and maintenance instructions and spare parts lists prior to the completion of the work it shall provide three copies of the publications for each piece of equipment he has furnished and installed under the Contract, upon receipt of the approved shop drawings.
- B. Publications shall be prepared for the specific equipment furnished and installed, containing the following information, and shall not refer to other sizes, types or models of similar equipment:
 - 1) Clear and concise instructions for the operation, adjustment, lubrication and other maintenance of the equipment, including a complete lubrication chart.
 - 2) A complete listing of all parts for the equipment, with catalog numbers and other data necessary for ordering replacement parts.
- C. Advertising literature will not be acceptable.

51. CUTTING AND PATCHING

Contract with Single Bid:

- A. Where the project does not involve separate bids pursuant to the New York General Municipal Law the following will apply:
 - 1) Where walls, floors, ceilings, roofs or other items require cutting for the installation of new work, all such cutting shall be done by the Contractor with the approval of the Construction Administrator; and the Contractor shall patch the opening to make the cut portions match the adjacent finished surfaces, unless otherwise indicated.
 - 2) The Contractor shall not endanger any existing condition by its operations.
 - 3) The cost of all cutting and patching caused by the Contractor's negligence shall be

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borne by the Contractor.

Contract with Separate Bids:

- B. If the project is one where separate bid specifications are required pursuant to the New York General Municipal Law the following will apply:
- 1) A sufficient time in advance of the construction of new floors, walls, ceilings, roofs, or other items, each Contractor shall be responsible for properly locating and providing in place all sleeves, inserts and forms required for their work, and shall furnish the Contractor for General Construction with complete information relative to exact locations and dimensions of all required openings in the General Contractor's work. Other Contractors shall periodically consult the Job Progress Chart of the General Contractor so that they will not be delayed by their work requirements, but the General Contractor shall be obliged to give all other Contractors at least seventy-two hours notice before commencing the previously mentioned new construction work.
 - 2) The cost shall be borne by the responsible Contractor for all cutting, patching, re-waterproofing and re-caulking of new work necessary for reception of the work of a Contractor, caused by the Contractor's failure to timely or properly locate and provide in place all sleeves, inserts and forms required for its own work, or by a Contractor's failure to inform the General Contractor of required openings. The General Contractor shall do all cutting, patching, re-waterproofing and re-caulking of all new work no matter how or by whom such work was caused and shall be reimbursed for such extra work by the responsible Contractor, in accordance with the terms of the Contract. All cutting and patching shall have prior approval of the Construction Administrator.
 - 3) Where sleeves, inserts, forms or openings are required in existing walls, floors, ceilings roofs, or other existing items, all necessary cutting, patching, re-waterproofing and re-caulking required shall be done by the individual responsible Contractor, except for finished surfaces. The responsible Contractor shall do all rough patching to bring the cut areas to the proper surface ready to receive the finished surface. All finishing work required to make the cut portions match the adjacent finished surfaces shall be performed by the General Contractor.
 - 4) Each Contractor shall be responsible for coordinating their work with the work of all other Contractors engaged on the project. If directed, Contractors shall submit coordinated shop drawings showing how the fitting of the various parts of the work will be accomplished, for the Construction Administrator's acceptance.
 - 5) All cutting and patching shall be governed by the applicable divisions of the Specifications with regard to workmanship, materials and methods.
 - 6) No Contractor shall endanger any work by unauthorized cutting, excavating, or other alteration of the work, unless previously authorized by the Construction Administrator.

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52. CONFLICTS AMONG CONTRACT DOCUMENTS

In the event of any conflict among the Contract Documents, the Contractor shall notify the Commissioner and comply with the Commissioner's interpretation, according to the following priorities:

<u>Priority Order</u>	<u>Document</u>
1.....	Modification issued after execution of Agreement
2.....	Agreement between Owner and Contractor
3.....	Addenda issued prior to the execution of the Agreement (Later date to take precedence)
4.....	Special Notices
5.....	Technical Specifications
6.....	Construction Drawings:
6A.....	Schedule on Construction Drawings
6B.....	Notes on Construction Drawings
6C.....	Large Scale Details on Construction Drawings
6D.....	Small Scale Details on Construction Drawings
7.....	General Requirements
8.....	Special Clauses
9.....	Information for Bidders and General Clauses

53. RECORD DRAWINGS

- A. The Owner shall furnish, at the first job meeting, one set of "paper" copies of the contract drawing(s) - this is in addition to the five sets of contract drawings as described in the Article "Contract Drawings" of the General Requirements; for the Contractor's use to indicate change(s) as they occur for the duration of the construction work. Upon request from the Contractor, the County will supply the Contractor a copy of the original Contract Drawings in AutoCAD format.
- B. The Contractor shall record neatly and legibly, using reasonable drafting care, all approved change(s) (including minor revisions or corrections of pipes, ducts, electric outlets, circuit panels and other features, as well as invert elevations and locations of underground lines).
- C. When all approved changes are recorded and clearly identified, the Contractor shall prepare a set of "as-built" (record) drawings, in the latest version of AutoCAD, using the approved County format and associated CAD layering guidelines, with 24" x 36" drawing sizes, showing the project as built including all changes in the work made during construction based on marked-up prints, drawings, and other data. These drawings shall be filed on a CD and submitted to the Construction Administrator.
- D. All additional "paper" or reproducible drawings are to be obtained by the Contractor at their own expense.

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54. TIME

- A. All time limits (see Article “Required Time For Completion Of The Work” of the General Requirements, and, Article “Time Of Starting” of the Information For Bidders) stated in the specifications are of the essence of the Contract.
- B. The Contractor may perform all necessary labor during other than normal working hours. The Owner imposes no limitation of the Contractor's working hours and whatever overtime work may be necessary or required shall be considered by the Contractor and reflected in its Bid Proposal without the benefit or extra compensation. The Contractor must give a minimum of four (4) hours notice to the Construction Administrator when overtime Work is necessary. The Contractor shall promptly pay to the County the additional cost of the Engineer and Construction Administrator for inspection services during the overtime Work.

55. ACCELERATION OF THE WORK

The Owner may, at its sole discretion and for any reason, require the Contractor to accelerate the schedule of performance by providing overtime, extended day, extra crews, Saturday, Sunday and/or holiday work and/or by having all or any subcontractors designated by the Owner provide overtime, extended day, extra crews, Saturday, Sunday or holiday work by the Contractor's or his subcontractor's own forces, and such requirements is independent of and not related in any way to any apparent inability of the Contractor to comply with the schedule(s), Milestone(s) and/or completion date requirements, the Owner, pursuant to a written change order as signed by the Commissioner shall reimburse the Contractor for the direct cost to the Contractor of the premium time for the labor utilized by the Contractor in such overtime, extended day, extra crews, Saturday, Sunday or holiday work (but not for the straight time costs of such labor) together with any social security and state or federal unemployment insurance taxes in connection with such premium time. However, no overhead, supervision costs, commissions, profit or other costs and expenses of any nature whatsoever, including impact costs or costs associated with lost efficiency or productivity, shall be payable in connection therewith. Anything to the foregoing notwithstanding, in the event that the Contractor has fallen behind schedule or in the Owner's judgment appears likely to fall behind schedule, Owner shall have the absolute right to direct the Contractor to accelerate the performance of its work, including that of its subcontractors, and the full costs for such acceleration shall be borne solely by the Contractor.

56. ULTRA LOW SULFUR DIESEL FUEL

- A. Contractors and Subcontractors operating onroad and nonroad vehicles to perform County work must power those vehicles with ultra low sulfur diesel fuel. Ultra low sulfur diesel fuel is any diesel fuel that has a sulfur content of no more than fifteen parts per million.
- B. In addition, all onroad and nonroad diesel vehicles used to perform County work and equipped with a model year 2003 or older engine shall utilize the best available

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technology² in accordance with the following schedule:

- a) effective September 1, 2007 - 35% of all such motor vehicles used on this project;
 - b) effective September 1, 2008 - 65% of all such motor vehicles used on this project;
 - c) effective September 1, 2009 - 100% of all such motor vehicles used on this project.
- C. All onroad and nonroad diesel vehicles to perform County work having a gross vehicle weight rating of more than 14,000 pounds shall utilize the best available technology or be equipped with an engine certified to the applicable 2007 United States Environmental Protection Agency ("EPA") standard for particulate matter as set forth in Section 86.007-11 of Title 40 of the Code of Federal Regulations or to any subsequent EPA standard for such pollutant that is at least as stringent, in accordance with the following schedule:
- a) by September 1, 2007 - 35% of all such motor vehicles;
 - b) by September 1, 2008 - 65% of all such motor vehicles;
 - c) by September 1, 2009 - 100% of all such motor vehicles
- D. Any contractor who violates any provision of Section 873.1329 shall be liable for a civil penalty not to exceed ten thousand dollars plus twice the amount of money saved by such contractor for failure to comply with this section.
- E. Any contractor who makes a false claim may be liable for a civil penalty not to exceed twenty thousand dollars, in addition to twice the amount of money saved by such contractor as a result of having made such false claim.
- F. Nothing in this section shall be construed to limit the County's authority to cancel or terminate a contract, deny or withdraw approval to perform a subcontract or provide supplies, issue a non-responsibility finding, issue a non-responsiveness finding, deny a person or entity pre-qualification as a vendor, or otherwise deny a person or entity public entity business.
- G. If sufficient quantities of ultra low sulfur diesel fuel are not available to meet the needs of a contractor to fulfill the requirements of this contract, the Contractor may submit a written request to the Commissioner to use diesel fuel with a sulfur content of no more than thirty parts per million as long as the contractor shall use whatever quantity of ultra low sulfur diesel fuel that is available. Such determination shall be made in writing on a case by case basis upon written application to the Commissioner. If the Commissioner grants such authority it shall expire sixty days thereafter and may be renewed upon written request for additional periods of sixty days.

² Best Available Technology means a system for reducing the emission of pollutants which is based on technology verified by the U.S. Environmental protection Agency or the California Air Resources Board or which has been identified pursuant to NYC's Department of Environmental Protection that (1) reduces diesel particulate matter emissions by at least 85 percent, as compared to a similar engine operating on traditional diesel fuel without emission control technology, or reduces engine emissions to 0.01 grams diesel particulate matter per brake horsepower per hour or less; and 2) achieves the greatest reduction in emissions of nitrogen oxides at a reasonable cost and in no case produces a net increase in nitrogen oxides in excess of 10%.

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H. The Contractor, in order to comply with Subsections B & C above, must retrofit its vehicles to include both of the following in order to comply with the Best Available Technology Requirements:

- Diesel Oxidation Catalysts (DOC)
- Crankcase Vent Filters (CVF)

If the Contractor wants to propose an alternative technology it must submit a written request to the Commissioner with sufficient detail to enable the Commissioner to make a determination as to whether to accept the alternative technology. Any approval of alternative technology must be in writing.

57. QUALIFIED TRANSPORTATION FRINGE PROGRAM

EXECUTIVE ORDER NO. 7-2005

Requires that contractors, concessionaires and vendors doing business with the County enroll in a Qualified Transportation Fringe Program as defined in §132(f)(1) of the IRS Tax Code for all contracts for goods or services of \$100,000 or more in any twelve month period during the contract term if such contractor, concessionaire or vendor employs more than 25 individuals who utilize public transportation and/or pay for commuter parking at least 1 day per week regardless of whether those employees are engaged in work pursuant to the contract.

Bidders shall submit the signed statement on Proposal Page 34. Notwithstanding the above, a Bidder may submit a Waiver Application on Proposal Page 35 to the Commissioner.

58. USE OF FLUORESCENT LIGHT BULBS & ENERGY EFFICIENT BULBS

The use of incandescent light bulbs is prohibited in County-owned buildings and facilities. Only fluorescent light bulbs may be installed in County buildings and facilities. Exterior lights must utilize energy-efficient bulbs. For further details see Article 58 of the General Clauses.

59. COUNTY OF WESTCHESTER PHOSPHORUS-FREE LAWN FERTILIZER POLICY

Executive Order 8-2007 limits the use of lawn fertilizers containing phosphorous and other compounds containing phosphorous, such as phosphate on County owned property.

EXECUTIVE ORDER NO.8 OF 2007

WHEREAS, the New York City water supply watershed is a critical drinking water source for approximately eight million New York City consumers and approximately one million upstate consumers. Over eighty-five percent (85%) of Westchester County's residents consume water from the New York City water supply system; and

WHEREAS, eutrophication is a natural aging process of lakes or streams brought on by

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nutrient enrichment. Eutrophication can be greatly accelerated by human activities that increase the rate at which nutrients and organic substances enter aquatic ecosystems from their surrounding watersheds; and

WHEREAS, as a result of accelerated eutrophication, enhanced plant growth reduces dissolved oxygen in the water creating severely impaired water bodies with unpleasant water taste and odor, discoloration, release of toxins and increased turbidity that interferes with the health and diversity of indigenous fish, plant, and animal populations and with the recreational use of rivers, lakes and wetlands. Consequently, eutrophication restricts water use for fisheries, recreation, industry, and drinking due to the increased growth of undesirable algae and aquatic weeds and the oxygen shortages caused by their death and decomposition; and

WHEREAS, nutrient pollution due to human activities is one of the leading causes of eutrophication in the NYC Watershed, and is specifically accelerated by the introduction of excessive phosphorus into the environment. In fact, most reservoirs in the East of Hudson portion of the New York City Watershed (5 of the 7 located in Westchester County) are designated as phosphorous-restricted basins in accordance with the New York City Watershed Rules & Regulations due to excessive phosphorous volumes which have not been reduced despite phosphorous reductions mandated by the New York State Department of Environmental Conservation (NYSDEC); and

WHEREAS, one unnecessary source of phosphorus pollution in the watershed is the many pounds of lawn fertilizer applied by residents and businesses in the County of Westchester each year; and

WHEREAS, when phosphorus fertilizer is applied to phosphorus-rich lawns, much of the excess simply runs off of the lawn into the storm drainage systems where it can be carried into rivers, lakes, streams, and wetlands, causing eutrophication; and

WHEREAS, soil tests conducted pursuant to a six-year study by the Cornell Cooperative Extension, an extension of the State's designated Land-Grant University, have shown that approximately 90% of the lawns in Westchester County have medium-to-high levels of phosphorus; and

WHEREAS, the New York City Watershed Pesticide and Fertilizer Technical Working Group, established by the New York City Watershed Memorandum of Agreement, issued a report in 2000, noting the high percentage of phosphorus in regional soils and recommending that phosphorus-based lawn fertilizers be added only when a soil analysis identifies phosphorus deficiencies.

WHEREAS, the proposed Stormwater Phase II regulations recently issued by the New York State Department of Environmental Conservation, and which are expected to go into effect in January of 2008, will allow the use of phosphorus-based lawn fertilizers on municipally-owned land only where soil testing indicates that phosphorus concentrations are inadequate, in order to ensure that municipalities in the New York City Watershed are

GENERAL CLAUSES

taking satisfactory steps to achieve the above-referenced mandatory phosphorous reductions.

WHEREAS, the United States Environmental Protection Agency has also determined that a Nonpoint Source Implementation Plan was necessary in the Croton Watershed because the phosphorus reductions necessary to meet the targeted applicable water quality standards could not be achieved by wastewater treatment plant upgrades alone; and

WHEREAS, Section 110.11 of the Laws of Westchester County places the responsibility to supervise, direct and control, subject to law, the administrative services and departments of the county, upon the County Executive; and

WHEREAS, I have determined that restricting the application and use of lawn fertilizer containing phosphorus on all County-owned property will address one source of unnecessary and preventable phosphorus pollution and will improve water quality in the County; and

WHEREAS, the Department of Planning, after review of the applicable regulations under the State Environmental Quality Review Act, has advised that this Executive Order has been classified as a Type II action, pursuant to 6 N.Y.C.R.R. § 617.5(c)(20), “routine or continuing agency administration and management, not including new programs or major reordering of priorities that may affect the environment,” and 6 N.Y.C.R.R. § 617.5(c)(27), “adoption of regulations, policies, procedures and local legislative decisions in connection with any action on this list.” As such, no further environmental review is required.

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NOW THEREFORE, I, _____, County Executive of the County of Westchester, in light of the aforementioned, do hereby order and direct each and every department, board, agency, and commission of the County of Westchester under my jurisdiction to ensure that the policies and procedures set forth in the following Phosphorus-Free Lawn Fertilizer Policy are complied with.

COUNTY OF WESTCHESTER PHOSPHORUS- FREE LAWN FERTILIZER POLICY

I. Definitions:

- (1) "Certified laboratory" means any laboratory certified by the New York State Department of Health pursuant to section five hundred two of the New York State Public Health Law to conduct soil analysis.
- (2) "Commercial fertilizer" means any substances containing one or more recognized plant nutrients which is used for its plant nutrient content, and which is designed for use or claimed to have value in promoting plant growth, except unmanipulated animal or vegetable manures, agricultural liming material, wood ashes, gypsum and other products exempted by regulation of the New York State Commissioner of Agriculture and Markets.
- (3) "Lawn fertilizer" means a commercial fertilizer distributed primarily for non-farm use, such as lawns, shrubbery, flowers, golf courses, municipal parks, cemeteries, greenhouses and nurseries, and such other use as the commissioner may define by regulation. Lawn fertilizer does not include fertilizer products intended primarily for garden and indoor plant application.

II. Use and Application of Lawn Fertilizer:

- (1) Any lawn fertilizer that is labeled as containing more than 0% phosphorus or other compound containing phosphorus, such as phosphate, shall not be applied upon any County-owned property, except as provided in section III. Of this Executive Order.
- (2) No lawn fertilizer shall be applied upon County-owned property when the ground is frozen.
- (3) Lawn fertilizer shall not be applied to any impervious surface upon County-owned property, including parking lots, roadways, and sidewalks. If such application occurs, the fertilizer must be immediately contained and either applied to turf in a manner consistent with this Executive Order or placed in an appropriate container.

III. Exemptions:

The prohibition against the use of lawn fertilizer under section II of this Executive Order shall not apply to:

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(1) Newly established turf or lawn areas during their first growing season.

(2) Turf or lawn areas that soil tests, performed within the past three years by a certified laboratory or by the Cornell University Cooperative Extension of Westchester County, confirm the need for additional phosphorus application in accordance with the phosphorus levels established by the Cornell University Cooperative Extension of Westchester County. The lawn fertilizer application shall not contain an amount of phosphorus exceeding the amount and rate of application recommended in the soil test evaluation.

(3) Agricultural uses, vegetable and flower gardens, or application to trees or shrubs.

IV. The transition to phosphorus-free lawn fertilizer shall occur as soon as possible in a manner that avoids wasting of existing inventories; accommodates establishment of supply chains for new products; enables the training of County employees and licensees in appropriate work methods; and allows the phase-out of products and practices inconsistent with this Executive Order. However, in no event shall lawn fertilizer containing phosphorus (i.e., labeled as containing more than 0% phosphorus or other compound containing phosphorus, such as phosphate) be applied upon County-owned property after January 1, 2009, unless an exemption set forth in Section III of this Executive Order applies.

V. This Executive Order shall take effect on the date hereof, and shall remain in effect until otherwise superseded, repealed, modified or revoked.



George Latimer, Westchester County Executive

4. SPECIAL CLAUSES

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1. INTENT

The Special Clauses modify or supplement the Information to Bidders, the General Clauses and the Standard Itemized Specifications and govern where there is conflict with those documents.

2. CONTRACT ITEMS

All Materials of Construction, General Construction Items and Item Specifications, and Roadside Development Payment Items and Item Specifications not prefixed with the letter "W" shall be as specified in Section 200 thru 600 of the latest version of the State of New York, Department of Transportation Design and Construction Division Standard Specifications including any Addenda thereto, hereafter referred to as the "NYSDOT Standard Specifications". In utilizing the State Standard Specifications, the following substitutions in the text shall be made:

- A. For State, substitute County of Westchester.
- B. For Department or Division, substitute Westchester County Department of Public Works and Transportation.
- C. For Superintendent or Deputy Superintendent, substitute Commissioner of Public Works and Transportation.
- D. For Chief Engineer, Deputy Chief Engineer, District Engineer, or Engineer in Charge, substitute Engineer.
- E. For Comptroller, substitute Commissioner of the Westchester County Department of Finance.

Copies of the State publication are available for reference purposes in the offices of the Engineering Division, Westchester County Department of Public Works and Transportation, Room 500, County Office Building, White Plains, New York. They are also available on line at the NYSDOT website.

3. PRE-CONSTRUCTION CONFERENCE

The Contractor shall not commence any work under the contract prior to a pre-construction conference between the Contractor, the County's representatives and other concerned governmental and utility company representatives. At this conference all special requirements of the work, the scheduling of the work and details for the proper maintenance and protection of traffic during the work will be fully explained and discussed.

In the event the Contractor desires to use traffic control devices other than those specified, it shall submit his request with samples or detailed sketches and descriptions of the proposed devices, for approval by the County.

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4. PRESERVATION OF NATURAL FEATURES

The Contractor shall exercise the utmost care to preserve and protect the natural features of all public and private property on or adjacent to the work site which will not be directly affected by the required construction. Before commencing work under the contract, the Contractor shall secure the Engineer's approval of proposed locations for temporary access roads not specified, storage areas for his equipment and materials, and parking areas for his own vehicles and those of his workmen. Thereafter, unless otherwise approved by the Engineer, the Contractor shall restrict all such activities to these locations. Before completion of the contract work, the Contractor shall restore at his own expense to their original condition or better, all temporary access, storage or parking areas and all other areas on or adjacent to the work site not directly affected by the required construction which have been disturbed in any way by the Contractor's operations.

The Contractor shall be responsible for the preservation and protection of all parts of existing trees within and bordering on the contract limits. As may be required, at his own expense the Contractor shall protect the trunks of trees against injury by the proper use of burlap padding, boards or other protective devices and means approved by the Engineer.

5. USE OF EXPLOSIVES

Unless expressly permitted by the contract documents, no blasting shall be allowed.

If blasting is permitted, explosives for blasting shall be stored, handled and used in accordance with the laws, ordinances and regulations of the State of New York and the local municipalities involved, and following the safety recommendations contained in the latest edition of the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, Inc., and the latest editions of the pamphlets published by the Institute of Makers of Explosives entitled, "Do's and Don'ts - Instructions and Warnings in Using, Transporting, Handling and Storing Explosives" and "Safety in the Handling and Use of Explosives".

The Contractor shall limit all blasting operations to a minimum and shall notify the Engineer and local municipal authorities at least seventy-two hours in advance of all such operations. No blasting of any kind shall be done during other than normal working hours on normal working days, unless permission is first secured from the Engineer and from local municipal authorities. The Contractor shall protect the traveling public from all damage to person and property and shall be responsible for damage to pipe lines, conduits, cables and any other surface or subsurface lines or structures that may be encountered, and for damage caused by blast shocks or debris.

The Contractor shall utilize only thoroughly trained and experienced men in all blasting operations, and blasting crews shall be held to the minimum consistent with efficient operation. They shall be thoroughly familiar with all recommended safety practices and shall be adequately supervised to insure that they adhere to those practices. No person under eighteen years of age shall be permitted to handle, use or be near explosives.

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In accordance with the New York State Penal Law, Section 1918 as amended, the Contractor or his subcontractor shall not discharge explosives in the ground unless written notice is first given seventy-two hours in advance to the person, corporation or municipality engaged in the distribution of combustible gas in the area. It shall further ascertain if there are any gas lines within a radius of two hundred feet from the point of discharge which are being maintained by a person, corporation or municipality other than the person, corporation or municipality servicing the territory. If there are, it shall give written notice seventy-two hours in advance to those parties. Thereafter the work shall be performed in such manner as to avoid damages to any pipe conveying combustible gas.

In any emergency, if explosives must be discharged in order to protect persons from immediate and substantial danger of death or serious personal injury, the seventy-two hour notice requirements of this article will be waived, provided the Engineer, the concerned persons, corporations or municipalities are notified as soon as reasonably possible before any such discharge is undertaken.

6. CONSTRUCTIONS, EXCAVATION AND DEMOLITION CONTRACTS AT OR NEAR UNDERGROUND FACILITIES - INDUSTRIAL CODE RULE NO. 53

The utility companies can be alerted to impending construction by the Contractor by contacting the Underground Utilities Call Center at 811 or 1-800-962-7962.

Notification to the Call Center is the responsibility of the Contractor who must allow ample time for investigation and identification of any and all services of the utility companies located at the project site.

All costs associated with verification of the location of underground facilities pursuant to Industrial Code Rule No. 53, as amended shall be included in the prices bid for the respective contract items involved unless separate payment is otherwise provided for in the Contract. All test holes excavated, by written direction of the Engineer, for purposes other than for compliance with Industrial Code Rule No. 53 or Subsection 105-06 of the Standard Specifications, will be paid for at the unit bid price for Trench and Culvert Excavation in the Contract unless a test pit item is expressly included in the contract.

7. CONSTRUCTION NEAR PIPES CONVEYING COMBUSTIBLE GAS

In accordance with the New York State Penal Law, Section 1918 as amended, the Contractor shall not excavate any existing street, highway or public place unless written notice shall have been given at least seventy-two hours in advance to the person, corporation or municipality engaged in the distribution of gas in such territory. It shall further ascertain whether there is within one hundred feet in such street, highway or public place any other person, corporation or municipality conveying combustible gas in pipe, and if there is such pipe, it shall also give similar notice to such person, corporation or municipality.

8. NOTICES TO UTILITY OWNERS

At least 3 working days before breaking ground for construction, the Contractor shall give written notice to all concerned utility owners that valve boxes, curb boxes, manholes and

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other similar structures must be adjusted to the finished surfaces of roadway, shoulder or sidewalk areas, or that pipes, conduits, poles or other structures must be altered, removed or relocated. Thereafter the Contractor shall give a reasonable opportunity to the owner of the utility or structure to have the work done. All work adjusting structures or altering, removing, relocating or installing pipes, conduits, poles or other structures will be done at the expense of the owners of the utility or structure, utilizing their own facilities if they so choose, or by utilizing the forces of the Contractor under separate contract.

9. FILLING AND BACKFILLING AT STRUCTURES, CULVERTS AND PIPES

All filling and backfilling at structures, culverts and pipes shall be done in accordance with the provisions of Section 200, Earthwork; subsection 203-3.15, "Fill and Backfill at Structures, Culverts and Direct Burial Cables", in the New York State Department of Transportation Specifications,

10. PIPES AND CULVERTS IN FILL AREAS

Where pipes or culverts are to be placed in fill areas, the Contractor shall first place and compact the fill to a plane one foot above the design elevation of the top of the pipe and thereafter excavate the trench.

11. PAYMENT LINES AND LIMITS

Payment Limit - A payment limit defines the boundary beyond which no quantities will be measured for payment. Whenever payment limits are indicated, only the work which is actually directed and completed within these limits will be measured and computed for payment. Payment limits may be revised in writing by the Engineer prior to performing the work.

Payment Line - Defines the exact line from which the work quantity will be computed. Whenever payment lines are indicated, quantities representing work completed will be computed from these lines only. No other lines or locations will be used to compute quantities. Payment lines may be revised in writing by the Engineer prior to performing the work.

12. PIPE CERTIFICATION DOCUMENTS

Prior to the delivery of any pipe to the construction site, the Contractor shall furnish properly attested documents certifying as to the type, class, name of manufacturer and source of supply of the pipe. One copy of each document shall be forwarded to the Engineer at the construction site and to the appropriate contact at the Department of Public Works and Transportation as determined by the Engineer, County Office Building, White Plains, New York.

13. AREAS INACCESSIBLE TO ROLLER

In areas inaccessible to conventional compactors, or where maneuvering space is limited, impact rammers, plate or small drum vibrators, or pneumatic buttonhead compaction equipment may be used with layer thickness not exceeding 6 inches before compaction.

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However, materials placed for subbase course construction shall have a maximum compacted thickness of 6 inches. Hand tampers shall not be permitted. The Engineer may approve or reject any of the above described mechanical devices based upon the results of appropriate on-site field tests.

14. DELIVERY OF MATERIALS

The Contractor shall make his own arrangements for the receipt of materials delivered to the construction site. No representative of the County will accept any materials ordered by the Contractor.

15. BITUMINOUS PAVEMENT ON EXISTING CONCRETE PAVEMENT

Where bituminous pavement of any type is to be placed on existing concrete pavement, the Contractor shall prepare the road surface as specified under Section 600, Incidental Construction, subsection 633, Conditioning Existing Pavement Prior to Hot Mix Asphalt (HMA) Overlay.

Prior to the placement of asphalt concrete pavement on existing concrete pavement, a tack coat of bituminous material as specified in the contract documents shall be applied to the cleaned concrete pavement at a rate as specified in the contract documents, subject to the directions of the Engineer. Payment for the foregoing work shall be deemed to be included in the unit price the Contractor has bid for the appropriate asphalt concrete item.

Prior to the placement of asphalt concrete pavement, the contact surfaces of all structures within or adjacent to the area of the new pavement shall be painted with the same bituminous material.

16. RESURFACING AT STRUCTURES NOT RAISED

Prior to the placement of resurfacing material, the Contractor shall cut out and remove the existing bituminous pavement within the area so indicated on the plans or five feet distance from all exterior faces of each structure not requiring raising for the resurfacing work, in accordance with the instructions of the Engineer. Payment for all the foregoing work shall be deemed to be included in the unit price the Contractor has bid for the various items of the Contract.

17. REPLACEMENT OF EXISTING CASTINGS

All municipally owned castings which are excessively worn or are cracked shall be replaced when ordered by the Engineer. Existing castings shall be removed utilizing equipment and in a manner approved by the Engineer, and disposition of the castings shall be in accordance with Article 21, "Salvable Materials" of the Special Clauses. The design of new castings shall conform to the standards of the municipality in which the work is being performed, unless otherwise directed by the Engineer. After castings have been set in place, they shall be painted with asphaltum or other approved coating material.

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Payment for the work of removing existing castings and furnishing and placing new castings shall be deemed to be included in the unit price the Contractor has bid for the item of work indicated in the Itemized Proposal, or from Item W800, Miscellaneous Additional Work, when so ordered by the Engineer, except that castings broken through the sole negligence of the Contractor shall be removed and replaced by him at his own expense.

18. PROTECTION OF PAVEMENT

No equipment other than equipment with rubber tires will be allowed on any existing pavement to remain or new pavement within the limits of the contract, unless the pavement has been first protected by planking or other means approved by the Engineer.

19. PROTECTION OF STRUCTURES FROM BITUMINOUS MATERIALS

Before applying any bituminous materials, the Contractor shall protect as may be necessary all inlets, catch basins, manholes, vaults, water valve boxes, walls, curbs, gutters and other similar structures to prevent their defacement by such materials. Structures shall be completely covered or treated to prevent bituminous materials from entering their covers, gratings or crevices, or to prevent their concealment. After the application of the bituminous materials has been completed, the Contractor shall inspect all structures within the area of such construction activities and remove all remaining bituminous defacements caused by his operations.

20. SALVABLE MATERIALS

All existing construction materials such as manhole and catch basin frames and castings, pipe, curbs, signs, guide railings and other similar salvable materials encountered in the work and owned by the County, a political subdivision of the County or third parties, which the Engineer directs to be salvaged but not reused in the work, shall be removed and stored by the Contractor at areas on or adjacent to the work site. The Contractor shall then notify the respective owners in writing that the salvaged material is awaiting their disposition. If the material is not claimed or removed by the owners within a reasonable time after written notices have been given, as determined by the Engineer, the materials shall then become the property of the Contractor and shall be removed by him before completion of the work under the contract.

Similar construction material which is removed by the Contractor and which the Engineer orders not to be salvaged, shall become the property of the Contractor and shall be immediately removed by him from the site of the work.

21. CLEANING OF CATCH BASINS AND MANHOLES

After completion of all other work under the contract, the Contractor shall thoroughly clean out all catch basins and manholes that have been built, altered or adjusted as part of the work of the contract, and shall remove from all other catch basins and manholes within the limits of the contract, all materials and debris deposited therein as the direct result of his operations under the contract. Payment for all the foregoing work shall be deemed to be included in the

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unit prices that the Contractor has bid for the appropriate payment item for buildings, altering or adjusting catch basins and manholes.

22. NOISY MANHOLE COVERS

After the work of resurfacing old pavement or the placement of new pavement has been completed, the Contractor shall check all structures within the limits of the contract for the existence of noisy manhole covers. All such manhole covers shall then be treated with an approved anti-rattling compound, in accordance with the directions of the Engineer. Payment for all the foregoing work shall be deemed to be included in the unit prices the Contractor has bid for the appropriate payment item for building, altering or adjusting catch basins and manholes.

23. GUARANTEE OF THE WORK UNDER THE CONTRACT

Unless otherwise stated in other parts of the specifications, all work performed under the contract shall be guaranteed by the Contractor against all defects resulting from the use of inferior materials, equipment or workmanship, for a period of one year from the date of final completion and acceptance of the work, or from the date the County takes possession and makes full use of the constructed facility.

24. CONTRACT WORK BY GENERAL CONTRACTOR

Contract work amounting to not less than 51 percent of the executed contract price shall be performed by the Contractor's own organization which shall be construed to include only workmen directly employed and paid by the Contractor, and equipment owned or rented by the Contractor, such equipment being furnished with or without operators.

The only exception to the foregoing requirement shall relate to "Specialty Items" as designated by the County in these specifications or during the course of the actual contract construction work. "Specialty Items" shall be construed to be limited to contract work requiring highly specialized knowledge, craftsmanship or equipment not ordinarily available in the contracting organizations qualified to bid on this contract as a whole, and in general, shall be limited to minor components of the total contract. Such "Specialty Items" of the contract work may be sublet by the Contractor, but only after he has solicited permission to do so from the County and the County has granted such permission and has approved the Contractor's proposed subcontractor.

The total sum of all County approved "Specialty Item" subcontracts as negotiated directly by the Contractor will be deducted from the contract price as executed between the Contractor and the County, before the County computes the final dollar amount of contract work that the Contractor must and shall perform with his own organization.

25. EXISTING VEGETATION

The Contractor shall give particular attention and care to protect from damage all existing vegetation, including turf, trees, ornamental plantings, etc., which is not within the actual

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construction limits. Every attempt shall be made to protect and save the vegetation that is near the construction limits according to the instruction of the Engineer.

26. EXISTING ROADS

Existing roads used for the hauling of materials shall be kept free from debris and maintained by the Contractor and left in a condition satisfactory to the Engineer. The Contractor is warned that it shall be held responsible for any damage to County, Town, City or Village roads or streets caused by the operation of his equipment, and that adequate repairs for such damage shall be required at his expense.

27. SIGN RELOCATIONS

All regulatory and directional traffic signs that require relocation due to roadway widening or other appurtenant work, as directed by the Engineer, will be done so by the Contractor with no direct payment for said work. The cost for this sign removal and relocation shall be deemed included in the various items of the Contract..

28. PORTLAND CEMENT CONCRETE

Unless otherwise specified, it is intended that all concrete placed under the Contract shall be air-entraining concrete. The type of Portland Cement to be used shall be Type 2 with an approved air-entraining agent as specified in Section 701-01 Portland Cement and Section 711-08 Admixtures of the Standard Specification. The amount of air-entrainment shall be as required in Table 501-3 of the same specifications.

29. ACCURACY OF PLANS AND SPECIFICATIONS

The detail plans and specifications for the contract have been prepared with care and are intended to show as clearly as is practicable the work required to be done. The contractor must realize however, that construction details can not always be accurately anticipated and that in executing the work, field conditions may require reasonable modifications in the details of the plans and quantities of work involved. Work under all items in the contract must be carried out to meet these field conditions to the satisfaction of the Engineer and in accordance with his instructions and the contract specifications.

The Contractor shall take no advantage of any apparent errors or omission in the plans or specifications. In the event the Contractor discovers an error or omission in the plans or specifications, it shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

30. CONFORMITY WITH PLANS AND SPECIFICATIONS

All work performed and all materials furnished shall be in reasonably close conformity with the lines, grades, cross sections, dimensions and materials requirements, including tolerances, shown on the plans or indicated in the specifications.

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Plan dimensions and contract specification values are to be considered as the target value to be strived for and complied with as the design value from which any deviations are allowed. It is the intent of the specifications that the materials and workmanship shall be uniform in character and shall conform as nearly as realistically possible to the prescribed target value or to the middle portion of the tolerance range. The purpose of the tolerance range is to accommodate occasional minor variations from the median zone that are unavoidable for practical reasons. When a maximum or minimum value is specified, the production and processing of the material and the performance of the work shall be so controlled that material or work shall not be preponderantly of borderline quality or dimension.

In the event that the Engineer finds the materials or the finished product in which the materials are used not within reasonably close conformity with the plans and specifications but that reasonably acceptable work had been produced, he shall then make a determination if the work shall be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by contract modification which will provide for an appropriate adjustment in the contract price for such work or materials as he deems necessary to conform to his determination based on engineering judgment.

In the event that the Engineer finds the materials or the finished product in which the materials are used not within reasonably close conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.

All traffic control devices (signs, signals, markings, and devices placed by the authority of a public body or official having jurisdiction for the purpose of regulating, warning or guiding traffic) shall be in conformity with the edition of the New York State Manual of Uniform Traffic Control Devices which is current on the date of advertisement for bids.

31. STAKEOUT

The Contractor will establish the lines, grades and measurements necessary in his opinion to properly locate the work, by setting suitably marked offset or reference stakes. These stakes will be referenced to the control points, coordinates and similar data that may be shown on the contract drawings, but the County reserves the right to modify that information. The Contractor shall inform the Engineer a reasonable time in advance of the time and place he intends to do this layout work.

The Contractor carefully and properly preserve all stakes, pins and markers set, and if any are destroyed or disturbed, they shall be reset at no cost to the County. All existing property lines and survey monuments which may of necessity have to be disturbed during the construction work will be properly tied to fixed points and reset by the Contractor, and the cost of replacement of any other existing property lines and survey monuments or temporary witness stakes set by the Engineer, which are disturbed by the Contractor's operations, shall be charged against the Contractor and deducted from future payments.

The Engineer shall check all lines, grades and measurements established by the Contractor, and shall satisfy himself as to their accuracy before allowing construction of any required structure or facility.

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32. BAN ON WORK PERFORMED BY NON-COUNTY ENTITIES

Any work which may be required or desired by non-County of Westchester entities (i.e. Con Edison, the Telephone Company, Cable TV, other governmental agencies, private corporations or individuals, etc.) within the specified limits of the project shall in no manner be performed by said Contractor(s) or Subcontractors retained by The County of Westchester under this Contract unless prior written approval is granted by the Commissioner of Public Works.

33. SIGNIFICANT CHANGES IN THE CHARACTER OF WORK.

In accordance with 23 CFR 635.109(a)(3):

The Engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the contract nor release the Surety, and the Contractor agrees to perform the work as altered.

If the alterations or changes in quantities significantly change the character of work under the contract, whether such alterations or changes are in themselves significant changes in the character of work, or by affecting other work cause such other work to become significantly different in character, an adjustment, excluding anticipated profits, will be made to the contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made by the Department, either for or against the Contractor, in such amount as determined to be fair and equitable.

If the alterations or changes in quantities do not significantly change the character of the work to be performed under the contract, the altered work will be paid for as provided elsewhere in the contract.

The term "significant change" shall be construed to apply only to the following circumstances: when the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or when a Major Item of work, defined as , is increased in excess of 125 percent, or decreased below 75 percent of the original contract quantity.

Any allowance for a change in unit price shall apply only to that portion of work in excess of 125 percent of the original contract item quantity, or in the case of a decrease below 75 percent, to the actual amount of work performed.

The County will administer the above Federal regulations as follows:

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The County may make, in writing, at any time during the work, any necessary changes in quantities and alterations to the work in order to satisfactorily complete the project. If the Contractor or the County discovers a change that constitutes a significant change in the character of work as defined below, the party discovering the change shall promptly provide the other party written notice of the significant change in the character of work before additional work is performed. The Contractor shall comply with notice and recordkeeping provisions of §104-06A 1 through 4, §104-06B 1 through 4 and §104-06C - Notice and Recordkeeping of the NYSDOT Standard Specifications.

The Contractor or the County, as the case may be, must make written notice to the other party of the existence of an apparent significant change in the character of work if that party wishes to adjust the contract price or time of performance, including direct costs and/or time related compensation, if applicable. Such notice shall be given within 15 calendar days of the time at which the party had knowledge, or should have had knowledge of an event, matter or occasion which results in a significant change in the character of work. The County will have no liability and no adjustment will be made for any damages which accrued more than 15 calendar days prior to the filing of such a notice with the Engineer.

Upon written notice, the Engineer will investigate the changes and if it is determined that the alterations or changes in quantities significantly change the character of work, whether such alterations or changes are in themselves significant changes in the character of work, or by affecting other work, cause such other work to become significantly different in character, an adjustment, excluding anticipated profits, will be made to the contract. The Engineer will make an initial response in writing to the Contractor, within 21 calendar days, with a determination whether or not an adjustment to the contract is warranted. Situations requiring examination of the site or input from other County personnel may require additional time to resolve. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made by the County, either for or against the Contractor, in such amount as determined to be fair and equitable.

No contract adjustment will be allowed unless the Contractor has provided the required written notice, or written notice was provided to the Contractor by the County.

If an agreement on an adjusted price has not been reached before the work begins, the Contractor shall keep daily records and make reports of all labor, material and equipment used in connection with such work and the cost thereof as specified in §30 – “Extra Work: Increased Compensation/Decreased Work: Credit To The Owner” of the General Clauses.

Compensation for increased costs of the work resulting from significant changes in the character of work will be made in accordance with §30 – “Extra Work: Increased Compensation/Decreased Work: Credit to the Owner” of the General Clauses.

Compensation for time related costs, if any, will be made in accordance with §26 – “Claims for Damages” and §27 – “Extensions of Time” of the General Clauses.

A. Character of Work. The term "significant change" shall be construed to apply only when the character of the work differs materially in kind or nature from that involved or included in the original proposed construction.

SPECIAL CLAUSES

B. Major Items. The term "significant change" shall be construed to apply to Major Items only when the quantity of a Major Item is more than 125%, or is less than 75% of the original contract quantity. A Major Item is defined as:

Major Item: Any contract pay item for which the original unit bid price multiplied by the original item quantity exceeds the following minimum major item value based on total contract bid price.

<u>Total Contract Bid Price</u>	<u>Major Item Value</u>
≤ \$1,333,333	\$20,000
> \$1,333,333 - \$66,500,000	1.5% of the total contract bid price
> \$66,500,000	\$1,000,000

Any allowance for a change in the unit price shall apply only to that portion of work in excess of 125% of the original contract item quantity, or to the actual amount of work performed if the quantity decreases below 75% of the original contract item quantity. The Contractor or the County, as the case may be, must make written notice to the other party of the "significant change" in the quantity of a major item if that party wishes to adjust the contract price or time of performance. Knowledge of a "significant change" in quantity could result from receipt of a change order (approved or unapproved), a letter directing a change in the contract work, review of plan details and estimates, review of work completed or progress payment quantities, or a combination of the above.

Total payments made for all work on a Major Item that decreases to below 75% of the original contract item quantity, will not exceed the total payments which would have been made if the original contract quantity had been completed at the original unit price bid. No payments will be made for items eliminated in their entirety.

C. Minor Items. The term 'significant change' shall be construed to apply to Minor Items only when extra work both (1) increases the quantity of a Minor Item to more than 200% of the original contract quantity and (2) results in an increase of more than \$5,000 from the original contract amount. A Minor Item is defined as:

Minor Item: Any contract pay item that does not meet the definition of a Major Item.

Any allowance for a change in the unit price shall apply only to that portion of work both in excess of 200% of the original contract item quantity, and in excess of \$5,000 greater than the original contract amount.

D. Lump Sum Items. Certain items of work may be Lump Sum items, wherein a single bid amount is intended to provide payment for all necessary work during the execution of the contract. The term "significant change" shall be construed to apply to lump sum items only to the extent that changes in other contract work items result in a significant change in the character of work required to complete "Lump Sum" items of work.



SAMPLE FORMS

DEPARTMENT OF PUBLIC WORKS

Division of Engineering

SAMPLE FORMS

AFFIRMATIVE ACTION PROGRAM REQUIREMENT- SUBCONTRACTOR(S)

County of Westchester, Department of Public Works

(To Be Completed By Subcontractor and Submitted with Request to Utilize Subcontractor)

Affirmative Action Program

An approved Affirmative Action Plan shall be required for all Subcontractors for public work where the subcontracted work exceeds \$50,000 or more than fourteen (14) persons are employed by the Subcontractor.

Does the Subcontractor participate in an approved Affirmative Action Program? Yes [☐] No [☐]

If Yes, give name of Program: _____

If No, how many employees will the Subcontractor employ on this project? _____

An approved Affirmative Action Program shall mean a plan approved or adopted by Westchester County including but not limited to, the Home-Town Plan, the Recruitment Training Program or any other program approved or meeting the requirements of the State or Federal government.

The "Monthly Employment Utilization Report" of the Sample Forms, shall be filled out by the Contractor and/or Subcontractor(s) who are required to have an Affirmative Action Program, prior to the start of the work.

SAMPLE FORMS

CONTRACTOR'S REPORT OF EMPLOYMENT AND WEEKLY AFFIDAVIT

County of Westchester, Department of Public Works

Contract No. _____

Report No. _____

Week(s) ending _____

Title of Contract and Location _____

Contractor or Subcontractor _____

Address _____

STATE OF _____)
COUNTY OF _____) SS.:

I, _____, being duly sworn, depose and say:

1. I pay or supervise the payment of the persons employed by _____
(Contractor or Subcontractor)
in connection with the above referenced contract;

2. During the payment period commencing on the ____ day of _____,
20____ and ending on the _____ day of _____, 20____, all persons employed by
_____ in connection with such contract have been paid in full
(Contractor or Subcontractor)
weekly wages and supplements earned by such persons except the following: (strikeout, if not
applicable)

3. Such persons have been paid the prevailing rate of wages and the supplements as
determined and required by Section 220 of the New York State Labor Law.

SAMPLE FORMS

4. No rebates or deductions have been deducted from such wages and supplements except as authorized or required by applicable statutes or regulations of the Federal, State and County Governments.

5. The following is a true and accurate summary of wages and supplements paid:

_____ During the week _____ Total to date

Number of names on payroll _____

Hours worked _____

Total wages earned _____

6. I have read the foregoing statement of wages and supplement, know the contents thereof, and the same is true to my own knowledge.

(Signature)

STATE OF NEW YORK)
COUNTY OF WESTCHESTER) ss.:

On this _____ day of _____, 20____, before me personally came _____ to me known, and known to me to be the person who executed the above instrument, and who being duly sworn did say that he executed the same.

Sworn to before me
this _____ day of _____

License No.

Notary Public - State of New York

SAMPLE FORMS

MONTHLY EMPLOYMENT UTILIZATION REPORT
County of Westchester, Department of Public Works

<u>MONTHLY EMPLOYMENT UTILIZATION REPORT</u>										JOB TITLE:		CONTRACT NO.:					
WESTCHESTER COUNTY DEPARTMENT OF PUBLIC WORKS DIVISION OF ENGINEERING										NAME AND LOCATION OF CONTRACTOR:		REPORTING PERIOD: FROM: _____ TO: _____					
CONSTRUCTION TRADE	CLASSIFICATION	TOTAL ALL EMPLOYEES BY TRADE				BLACK (NOT HISPANIC ORIGINAL)		WORK HOURS OF EMPLOYMENT				MINORITY PERCENTAGE %	FEMALE PERCENTAGE %	TOTAL NUMBER OF EMPLOYEES		TOTAL NUMBER OF MINORITY EMPLOYEES	
		M	HRS	F	HRS	M	F	M	F	HISPANIC	ASIAN OR PACIFIC ISLANDERS			AMERICAN INDIAN OR ALASKAN NATIVE	M	F	M
	JOURNEY WORKER																
	APPRENTICE																
	TRAINEE																
	SUB-TOTAL																
	JOURNEY WORKER																
	APPRENTICE																
	TRAINEE																
	SUB-TOTAL																
	JOURNEY WORKER																
	APPRENTICE																
	TRAINEE																
	SUB-TOTAL																
	JOURNEY WORKER																
	APPRENTICE																
	TRAINEE																
	SUB-TOTAL																
	JOURNEY WORKER																
	APPRENTICE																
	TRAINEE																
	SUB-TOTAL																
	TOTAL JOURNEY WORKER																
TOTAL APPRENTICES																	
TOTAL TRAINEES																	
GRAND TOTAL (#HRS & #EMPL)																	
COMPANY OFFICIAL'S SIGNATURE AND TITLE:										TELEPHONE NUMBER (Include Area Code):				DATE SIGNED:		PAGE: _____ OF _____	

This report must be filled out by all contractors (both prime and sub) who are required to have an Affirmative Action Program, and must be filed with the Engineer by the 5th day of each month during the term of the Contract, and shall include the total work hours of each employee classification in each trade in the covered area for the Monthly Reporting Period. The Prime Contractor shall submit a report for its Aggregate Work Force and collect and submit reports for each subcontractor's Aggregate Work Force to the Engineer.

SHOP DRAWING SCHEDULE
County of Westchester, Department of Public Works

Forms Page 5

SAMPLE FORMS

SHOP DRAWING ID

County of Westchester, Department of Public Works

WESTCHESTER COUNTY DRAWING _____ OF _____

NAME OF PROJECT

Date _____

Contract No. _____

Item/Model No. _____

Manufacturer _____

Contract Drawing No. _____

Specification Section _____

This document has been reviewed, coordinated and checked for accuracy of content and for compliance with the Contract Documents. The information contained herein has been coordinated with all other Contract Work.

Contractor _____

Signed _____

REQUEST FOR APPROVAL OF EQUAL
County of Westchester, Department of Public Works

[illegible]

Forms Page 7

REQUEST FOR APPROVAL OF SUBSTITUTIONS

<u>ITEM NO.</u>	<u>ITEM</u>	<u>SUBSTITUTION</u>	<u>COST OF SPECIFIED ITEM</u>	<u>COST OF SUBSTITUTED ITEM</u>	<u>SAVINGS TO COUNTY</u>
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[illegible]

Forms Page 8

SAMPLE FORMS

CONTRACTOR'S ULTRA LOW SULFUR DIESEL FUEL AFFIDAVIT

County of Westchester, Department of Public Works

Contract No. _____ Period Included in this Report: _____, 20__ to _____, 20__

Title of Contract and Location _____

Contractor _____

Address _____

Subcontractor _____

Address _____

STATE OF _____) ss.:
COUNTY OF _____)

I, _____ being duly sworn, depose and say:
(print name) (print title)

1. I certify under penalty of perjury that I agree to comply with the requirements of Chapter 878, Article XIII, Section 873.13.29 of the Laws of Westchester County.
2. During the period _____ through _____, all diesel-powered vehicles, used in the performance of Contract No. _____, were powered by ultra low sulfur diesel fuel (15 ppm Sulfur Maximum).
3. No fuel other than Ultra Low Sulfur Diesel Fuel (15 ppm Sulfur Maximum) was utilized on this project for the above described vehicles.
4. The annexed Ultra Low Sulfur Diesel Fuel Log is a true and accurate summary of the low sulfur diesel fuel (15 ppm Sulfur Maximum) purchased and utilized in the performance of this project.
5. I have read the foregoing statement, have full knowledge of the contents thereof, and it is my intent that the County of Westchester will rely on the statements contained herein.

(Signature)

STATE OF _____) ss.:
COUNTY OF _____)

On this _____ day of _____, 20__, before me personally came _____ to me known, and known to me to be the person who executed the above instrument, and who being duly sworn did say that he/she executed the same.

Sworn to before me this

_____ day of _____, 20__.

Notary Public

The Ultra Low Sulfur Diesel Fuel-Log must be attached.

This Certification also has to be submitted by your subcontractor(s). *Additional copies of this form can be acquired from the Department of Public Work.*

SAMPLE FORMS

ULTRA LOW SULFUR DIESEL FUEL (15 ppm Sulfur Maximum) – LOG

Period of Log: _____ through _____

Contract No. _____

Title of Contract and Location _____

Contractor or Subcontractor _____

Address _____

Date of Purchase	Name and Address of Vendor (Print)	Gallons Purchased

A Separate Copy of this Certification will also have to be signed by each of your subcontractors that utilize diesel powered vehicles, fifty horsepower or greater, on the above project. Additional copies of this form can be acquired from the Department of Public Works.

- ☐ New
☐ Change
☐ No Change

**Electronic Funds Transfer (EFT)
Vendor Direct Payment Authorization Form**

INSTRUCTIONS: Please complete both sections of this Authorization form and attach a voided check. See the reverse for more information and instructions (Forms Page 21). If you previously submitted this form and there is no change to the information previously submitted, ONLY complete lines 1 through 6 of section 1.

Section I - Vendor Information

1. Vendor Name:

2. Taxpayer ID Number or Social Security Number:

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3. Vendor Primary Address

4. Contact Person Name:

Contact Person Telephone Number:

5. Vendor E-Mail Addresses for Remittance Notification:

6. Vendor Certification: *I have read and understand the Vendor Direct Payment Program and hereby authorize payments to be received by electronic funds transfer into the bank that I designate in Section II. I further understand that in the event that an erroneous electronic payment is sent, Westchester County reserves the right to reverse the electronic payment. In the event that a reversal cannot be implemented, Westchester County will utilize any other lawful means to retrieve payments to which the payee was not entitled.*

Authorized Signature_____
Print Name/Title_____
Date**Section II- Financial Institution Information**

7. Bank Name:

8. Bank Address:

9. Routing Transit Number:

--	--	--	--	--	--	--	--	--	--

10. Account Type:
(check one)☐ Checking☐ Savings

11. Bank Account Number:

12. Bank Account Title:

13. Bank Contact Person Name:

Telephone Number:

14. FINANCIAL INSTITUTION CERTIFICATION (required **ONLY** if directing funds into a Savings Account **OR** if a voided check is not attached to this form): *I certify that the account number and type of account is maintained in the name of the vendor named above. As a representative of the named financial Institution, I certify that this financial Institution is ACH capable and agrees to receive and deposit payments to the account shown.*

Authorized Signature_____
Print Name / Title_____
Date

**(Leave Blank - to be completed by
Westchester County) - Vendor number assigned**

(WC DPW E Version 11/3/08)

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Forms Page 11

Electronic Funds Transfer (EFT) Vendor Direct Payment Authorization Form

GENERAL INSTRUCTIONS

Please complete both sections of the Vendor Direct Payment Authorization Form and forward the completed form (along with a voided check for the account to which you want your payments credited) to: Westchester County Board of Acquisition and Contract, 148 Martine Ave, Room 104, White Plains, NY 10601, Attention: Vendor Direct. Please see item 14 below regarding attachment of a voided check.

Section I - VENDOR INFORMATION

1. Provide the name of the vendor as it appears on the W-9 form.
2. Enter the vendor's Taxpayer ID number or Social Security Number as it appears on the W-9 form.
3. Enter the vendor's complete primary address (not a P.O. Box).
4. Provide the name and telephone number of the vendor's contact person.
5. Enter the business e-mail address for the remittance notification. THIS IS VERY IMPORTANT. This is the e-mail address that we will use to send you notification and remittance information two days prior to the payment being credited to your bank account. We suggest that you provide a group mailbox (if applicable) for your e-mail address. You may also designate multiple e-mail addresses.
6. Please have an authorized Payee/Company official sign and date the form and include his/her title.

Section II - FINANCIAL INSTITUTION INFORMATION

7. Provide bank's name.
8. Provide the complete address of your bank.
9. Enter your bank's 9 digit routing transit number.
10. Indicate the type of account (check one box only).
11. Enter the vendor's bank account number.
12. Enter the title of the vendor's account.
13. Provide the name and telephone number of your bank contact person.
14. If you are directing your payments to a Savings Account OR you can not attach a voided check for your checking account, this line needs to be completed and signed by an authorized bank official. IF YOU DO ATTACH A VOIDED CHECK FOR A CHECKING ACCOUNT, YOU MAY LEAVE THIS LINE BLANK.



SAMPLE CONTRACT AND BOND
FOR CONSTRUCTION

DEPARTMENT OF PUBLIC WORKS

Division of Engineering

WESTCHESTERGOV . COM

**DEPARTMENT OF PUBLIC WORKS
OFFICE OF THE COMMISSIONER**

CONTRACT AND BOND

FOR CONTRACT

NOTE: ONLY PROVIDED AS A SAMPLE IN THESE SPECIFICATIONS FOR INFORMATIONAL PURPOSES AND NOT TO BE EXECUTED WHEN SUBMITTING THE BID PROPOSAL. THE SUCCESSFUL BIDDER WILL BE REQUIRED TO EXECUTE THESE DOCUMENTS, AS MORE FULLY DESCRIBED IN THE PROPOSAL REQUIREMENTS.

CONTRACT NO.

Amount of Contract \$

THIS AGREEMENT made this ____ day of _____, 200__, by and between the COUNTY OF WESTCHESTER, a municipal corporation of the State of New York, hereinafter, "County", and

hereinafter called the "Contractor", WITNESSETH as follows:

WHEREAS, the Commissioner of Public Works, hereinafter called "Commissioner", by virtue of the power and authority in him vested did advertise for proposals and bids for:

Westchester County, New York, to furnish all labor, tools, implements and materials that may be requisite and necessary to the execution and completion of the work according to the plans, specifications, profiles and other drawings relating to such work, as approved by the County of Westchester and now on file in the Office of the Commissioner, and

WHEREAS, the Contractor did bid for said work in the manner and form as required by said plans and specifications and, being the lowest responsible bidder therefore, was duly awarded the Contract for such work at prices named in the itemized proposal by a resolution of the Board of Acquisition and Contract of the said County of Westchester.

NOW THEREFORE, the Contractor, in consideration of the prices so named for the various items of work to be paid for as hereinafter provided, does for itself, its representatives, agents, executors, administrators, successors or assigns, covenant and agree with the County that it, the said Contractor, shall and will at its own proper costs and charges and in conformity with said plans and specifications which are made a part of this Contract without setting forth same herein, provide all manner and kind of materials, molds, models, cartage, appliances and appurtenances required and of every description necessary for the due and proper performance of this Contract and the completion of said work to be done under the supervision and direction of the Commissioner, in a good workmanlike manner and in conformity with said plans and specifications without any alteration, deviation, additions, or omissions therefrom except upon due request and under the written direction of said Commissioner.

The Contractor acknowledges receipt of the "Information for Bidders, General and Special Clauses, Specification, Proposal and Plans" relating to this Contract, as well as all issued Addenda thereto, all of which are expressly incorporated in this Contract as if fully set forth herein.

IT IS FURTHER UNDERSTOOD AND AGREED by and between the parties to this Contract that if in the opinion of the said Commissioner of the County of Westchester it shall become necessary to make any change in the work called by the plans and specifications which are a part of this Contract, whereby, consistent with the Information for Bidders, the work contemplated by said plans and specifications is modified and reduced and the costs and expenses of such work lessened, that then and in that event the Contractor will do the work as changed and modified and the said Commissioner shall estimate the difference between the original estimate of quantities therefor and the amount that should be paid by reason of the modification and change and the difference shall be deducted from the original estimate of quantities therefore of said Contract and said Contractor shall be paid accordingly. The estimate of said Commissioner shall be final and conclusive upon the parties hereto and may not be challenged except in a proceeding commenced pursuant to Article 78 of the Civil Practice Law and Rules. Any changes, modifications or deductions shall in no way invalidate this Contract and said Contractor agrees that in the event of any such change or modification reducing the original, estimated quantities therefore, it will not make any claim for any profit, or loss of profit by reason thereof. Notwithstanding any dispute or disagreement arising hereunder, Contractor agrees that the Work shall not be delayed nor disrupted by reason thereof.

The County hereby covenants and agrees with the said Contractor, in consideration of the covenants and agreements herein being strictly and in all respects complied with by the said Contractor as specified, that it will well and truly pay unto the said Contractor the unit prices set forth in the Proposal for the various items included in the Contract.

All partial payments will be made in accordance with the provisions set forth in the "Information for Bidders" and especially that part thereof which relates to "Estimates and Payments".

Furthermore, all partial payments will be made on the claim voucher and verified certificate of the Commissioner, both of which shall be filed in the Office of the Commissioner of Finance of the County of Westchester. The said claim voucher shall show the value of the work completed and the verified certificate shall show the said work was done in accordance with the plans and specifications.

With the final estimate the Contractor shall furnish to the Construction Administrator a sworn statement listing all unpaid bills and liabilities incurred under this Contract up to and including the date of the estimate. Where there are any bills or liabilities in excess of moneys due under any estimate under this Contract, the Construction Administrator may withhold payment of the estimate pending a satisfactory proof of settlement or adjustment of any excess claims. No final estimate will be approved or passed for payment unless and until the Contractor furnishes satisfactory proof that all bills and liabilities incurred under the Contract are paid in full and complies with the requirements of Section 220-a of the Labor Law.

Acceptance shall be effected as follows: whenever, in the opinion of the Commissioner, the Contractor shall have completely performed the Contract on his part to be performed, the Commissioner shall so certify in writing to the Board of Acquisition and Contract of the County and file such certificate with the said Board, stating therein, in substance that the work has been duly examined by him and that the same has been fully performed and completed in accordance

with the terms of the Contract therefor, and recommending the acceptance thereof. When the Board of Acquisition and Contract by resolution duly adopts, approves and ratifies, the said acceptance shall be complete. No final payment shall be made under this Contract until such certificate of completion and recommendation of acceptance have been approved and ratified by a resolution of said Board of Acquisition and Contract.

Unless otherwise provided for in the contract documents, the Commissioner may take over, use, occupy or operate any part of the Work at any time prior to Final Acceptance upon written notification to the Contractor. The Engineer shall inspect the part of the Work to be taken over, used, occupied or operated, and will furnish the Contractor with a written statement of the Work, if any, that 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 herein. In the event the Commissioner takes over, uses, occupies or operates any part of the work: (i) the Commissioner shall issue a written determination of Substantial Completion with respect to such part of the Work; and (ii) the Contractor shall be relieved of its absolute obligation to protect such part of the unfinished work in accordance with Article 20 of the General Clauses.

The Commissioner will approve a final estimate for final payment consistent with the authorization of final acceptance from the Board of Acquisition and Contract less previous payments and any and all deductions authorized to be made by the Commissioner under the Contract or law. Payment pursuant to such final estimate less any additional deductions authorized to be made by the Commissioner of Finance under the Contract or law shall constitute the final payment and shall be made by the Commissioner of Finance. If the contract is terminated prior to final acceptance the Commissioner is authorized to prepare a final payment as otherwise authorized by the Board of Acquisition and Contract subject to the above noted adjustments.

Upon the completion and acceptance of this Contract by the Board of Acquisition and Contract, as aforesaid, the Commissioner shall proceed with all reasonable diligence to ascertain from actual measurements the whole amount of work done by the Contractor, and also the value of such work under and according to the terms of this Contract, and thereupon make out in writing a final estimate therefor.

After the completion and acceptance as herein above-mentioned, the Commissioner of Public Works shall file with the Commissioner of Finance of the County of Westchester the original verified certificate, claim voucher and the certification required by Section 220-a of the Labor Law, together with a certified copy of the resolution of approval and ratification of the Board of Acquisition and Contract of the said verified certificate and claim voucher and the resolution of acceptance of completion.

IT IS FURTHER UNDERSTOOD AND AGREED by and between the parties to this Contract that the Contractor will accept the unit prices named in the proposal for all additions to or deductions from the original quantities as given in the specifications. It is agreed that the Commissioner will make estimates of the value for the work completed as provided in the specifications and the final estimate will be made accordingly.

The Contractor further agrees that if at any time before or within thirty days after the whole of the work herein agreed to be performed has been completed and accepted any person or persons claiming to have performed any labor or furnished any material towards the performance and completion of this contract shall file with the proper officials any such notice as is described in the Lien Law, or any other act of the Legislature of the State of New York, the Contractor shall cause such Lien to be discharged of record. Otherwise and in every case and until the Lien is discharge of record the County shall retain, anything herein to the contrary notwithstanding, from the moneys under its control and due or to grow due under this Contract the sum of one hundred fifty (150%) percent of the amount of such Lien, unless otherwise authorized to withhold a larger amount. The Contractor further agrees to pay the County upon demand the costs, including but not limited to attorney's fees, incurred by the County in any action(s) brought to foreclose or otherwise enforce said Lien.

The Contractor covenants and agrees to commence the work embraced in this Contract within Ten [10] calendar days after service upon him, by the Commissioner, of written notice instructing him to begin the work and shall complete the same in all respects within _____ consecutive calendar days computed from the date of such Notice to Commence.

It is further understood and agreed by the parties hereto that the time of completion is of the essence of this Contract.

It is further understood and agreed by the Contractor that before entering upon the performance of this Contract it shall have approved by the County Attorney the Bond required to be furnished by it in the sum of-----
[\$ _____] conditioned for the faithful performance of the work.

The Contractor hereby covenants and agrees to observe the plans, specifications and directions of the Commissioner in the doing of the work provided for under this Contract and to furnish the necessary materials and implements required therefore and to remove condemned material and rubbish as provided by plans and specifications and to employ a competent and sufficient force of workmen to complete the work of this improvement within the time specified. Should the Contractor at any time become insolvent, make an assignment for the benefit of creditors, abandon the Work, reduce its working force to a number which, if maintained, would be insufficient, in the sole opinion of the Commissioner, to complete the Work in accordance with the approved progress schedule; sublet, assign or otherwise dispose of this Contract other than as permitted elsewhere herein, refuse or neglect to supply a sufficiency of properly skilled workmen, or of material of the proper quantity or fail in any respect to prosecute the work with promptness and diligence, or fail in any other way in the performance of any of the agreements herein contained; all the foregoing being deemed acts of default, and such default being certified by the Commissioner, the County of Westchester, acting by the Board of Acquisition and Contract, shall be at liberty after five days written notice to the Contractor to provide any such labor or materials, use any and all sums due or to become due to the Contractor under this Contract, to pay for such labor and material, and if the Commissioner shall certify that such default is sufficient ground for such action, the County of Westchester acting by the Board of Acquisition and Contract, shall also be at liberty to terminate the employment of the Contractor for the said work and to enter upon the premises and take possession for the purpose of completing the work included under this Contract of all materials, tools and appliances thereon

and to employ any other person or persons to finish the work and provide the materials therefore. Upon the Contractor's receipt of a notice from the County the Contractor shall immediately discontinue all further operations under this Contract. In case of such termination, the Contractor shall not be entitled to receive any further payment under this Contract until the said work shall be wholly finished, at which time if the unpaid balance of the amount to be paid under this Contract shall exceed the reasonable value of the work performed and the material furnished or the total costs therefor, whichever is greater, in finishing the work, such excess shall be paid by the County of Westchester to the Contractor, but if such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the County.

The expense incurred by the County and the total costs as herein provided either for furnishing materials or for finishing the work and any damage incurred through such default shall be certified by the Commissioner whose certificate thereof shall be final and conclusive upon the parties and may not be challenged except in a proceeding commenced pursuant to Article 78 of the Civil Practice Law and Rules.

In case the County shall declare the Contractor in default as to a part of the work only, the Contractor shall immediately discontinue such part, shall continue performing the remainder of the Work in strict conformity with the terms of the Contract.

In completing the whole or any part of the Work under the provisions of this Contract, the Commissioner shall have the power to depart from or change or vary the terms and provisions of this Contract. 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 certification of the cost of completion referred to above, 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 his default or partial default.

In addition to termination as provided for above, the County may terminate this Contract for the convenience of the County by written notice to the Contractor from the Commissioner. In such event and upon receipt of such notice the Contractor shall stop work on the date specified in the notice; take such actions as may be necessary to protect and preserve the County's materials and property; cancel all cancelable orders for material and equipment; assign to the County and deliver to the jobsite or any other 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 which has been specifically fabricated for the sole purpose of this Contract and not incorporated in the Work; and take no action that will increase the amounts payable by the County under this Contract.

In the event the contract is cancelled for the convenience of the County the following provisions shall apply:

- (a) For Work completed prior to the notice of termination, the Contractor shall be paid the fair and reasonable value of its work determined by the pro rata portion of the lump sum bid amount based upon the percent completion of the Work as of the date of termination as determined by the Commissioner, plus work completed pursuant to approved change orders, less amounts

previously paid. For purposes of determining the pro rata portion of the lump sum bid amount to which the Contractor is entitled, the Contractor's approved bid breakdown pursuant to Article 21 of the Information for Bidders shall be considered but shall not be dispositive as to the fair and reasonable value.

- (b) For non-cancelable material and equipment that is not capable of use except in the performance of this Contract and which has been specifically fabricated for the sole purpose of this Contract, but not yet incorporated in the Work, the Contractor shall be paid the fair and reasonable value thereof as determined by the Commissioner, but not more than the Contractor's cost for such material and equipment, plus an additional sum of two (2%) percent of such fair and reasonable value.
- (c) In the event the County terminates a lump sum Contract for convenience within thirty (30) days after the Contractor has received the Notice of Award from the County, the Contractor shall be paid one (1%) percent of 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 (a) and (b).
- (d) On all unit price Contracts, or on unit price items in a Contract, the County will pay the Contractor the sum of (e) and (f) below, less all payments previously made pursuant to this Contract:
- (e) For all completed units, the unit price stated in the Contract, and
- (f) For units that have been ordered but are only partially completed, the Contractor will be paid (i) a pro rata portion of the unit price as stated in the Contract based upon the percent completion of the unit as determined by the Commissioner and (ii) for non-cancelable material and equipment, payment will be made pursuant to (b), above.
- (g) The Commissioner's determination(s) hereunder shall be final, binding and conclusive and subject to review only pursuant to Article 78 of the New York Civil Practice Law and Rules.
- (h) The County shall not be liable to the Contractor for any payment or claim if the termination for convenience results in a reduction of thirty (30%) percent or less of the original contract price as bid.

On all Contracts or items in a Contract where time and material records are specified as the basis for payment of the Work, the Contractor shall be paid in accordance with Article 29 of the General Clauses, less all payments previously made pursuant to this Contract.

In no event shall any payments made pursuant to a termination for convenience exceed the Contract price for such items, either individually or collectively.

All payments made pursuant to a termination for convenience shall be in the nature of liquidated damages and shall be accepted by the Contractor in full satisfaction of all claims against the County.

The County may deduct or set off against any sums due and payable arising from a termination for convenience, any claims it may have against the Contractor.

In the event the County terminates the Contractor for default and it is subsequently determined that the Contractor was not in default, said termination shall automatically be converted for all purposes into a termination for convenience.

It is further understood and agreed between the parties hereto that no certificate given or payment made under this Contract, except the final certificate or final payment shall be conclusive evidence of the performance of this Contract either wholly or in part and that no payment shall be construed to be an acceptance of defective work or improper materials. If the Contractor shall fail to replace any defective work or materials, the County may cause such defective materials to be removed and defective work to be replaced and the expense thereof shall be deducted from the amount to be paid the Contractor.

Anything to the contrary in the preceding paragraph notwithstanding, the Contractor is responsible for the repair of defects in materials and workmanship for a period of one year from the date of final acceptance of the work by the Board of Acquisition and Contract, unless a longer term is specified in the specifications.

The Contractor further agrees not to assign, transfer, convey, sublet or otherwise dispose of this Contract, or its right, title or interest in or to the same, or any part hereof without the previous consent in writing of the Board of Acquisition and Contract of the County. Before a Subcontractor shall proceed with any work, the Commissioner must first recommend and the Board of Acquisition and Contract must approve the use of the Subcontractor on this Contract. If a Subcontractor is not approved it may not work on this Contract. The Contractor specifically waives any claim due to the failure or refusal of the Commissioner or the Board of Acquisition and Contract to approve said Subcontractor.

The Contractor agrees to hold himself responsible for any claims made against the County for any infringement of patents by the use of patented articles in the construction and completion of the work or any process connected with the work agreed to be performed under this Contract or of any material used upon the said work, and shall indemnify and save harmless the County for the costs, expenses and damages which the County may be obligated to pay by reason of any infringement of patents used in the construction and completion of the work.

The parties hereto agree that no laborer, workman or mechanic in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the Contract shall be permitted or required to work more than eight hours in any one calendar day or more than five days in any one week except in cases of extraordinary emergency including fire, flood or danger to life or property. No such person shall be so employed more than eight hours in any day or more than five days in any one week except in such emergency. Time lost in any week because of inclement weather by employees engaged in

the construction, reconstruction and maintenance of highways outside of the limits of cities and villages may be made up during that week and/or the succeeding three weeks.

The Contractor further agrees to erect and maintain during construction all necessary guards, rails and signals to prevent accidents to persons, vehicles or to the adjoining property and also agrees to use all necessary precautions in blasting and that he will indemnify and save the County of Westchester harmless from all suits and actions of any kind and nature whatsoever from or on account of the construction of said work.

It is further understood and agreed by the parties hereto that should any dispute arise respecting the true construction, interpretation or meaning of the Contract plans, specifications or conditions herein, or the measurements for the payment thereunder, same shall be referred to and decided by the said Commissioner and his decision thereon shall be final and conclusive upon the parties thereto and may not be challenged except in a proceeding commenced pursuant to Article 78 of the Civil Practice Law and Rules. This provision shall also apply to the true value of and duly authorized extra work or any work permitted by agreement in case any work shall be ordered performed, or any work called for shall be so omitted under and upon the direction of said Commissioner.

The Contractor by the submitting of bids and execution of this Contract hereby covenants and agrees that he has examined the plans, specifications and the site work, as to local conditions, difficulties and accuracy of approximate estimate of quantities and does hereby further covenant and agree that he will not make any claim for damages by reason of any such local conditions, difficulties or variation of approximate estimate of quantities.

The Contractor represents and warrants to the County with the knowledge and expectation that this warranty will be relied upon by the County that it is not now participating and has not at any time participated, either directly or through any substantially owned or affiliated person, firm, partnership or corporation, in an international boycott in violation of the provisions of United States Export Administration Act of 1969, 50 USC 2401 et seq. or the regulations promulgated thereunder.

The Contractor further warrants and represents that it is financially solvent, and sufficiently experienced and competent to perform the work and that the facts provided by it to the County in its bid and supporting documents, and contract documents are true and correct in all respects.

This Contract shall become void and any rights of the Contractor hereunder shall be forfeited if, subsequent to the execution hereof, the Contractor is convicted of a violation of the provision of the United States Export Administration Act of 1969, 50 USC 2401 et seq. as amended or has been found upon the final determination of the United States Commerce Department or any other appropriate agency of the United States or the State of New York to have violated such act or regulations.

If the Contractor, any officer, director, or any party holding a controlling interest (defined as five (5%) percent or more, or in the case of a corporation, any stockholder owning five (5%) percent or more of the outstanding shares) is convicted of a crime (excluding Class B and

Unclassified Misdemeanors as defined under the New York State Penal Law and their equivalent in any city, state or under Federal law related to the type of services or activities which are the subject matter of this Contract) or if a related or affiliated company, partnership or corporation is convicted of a crime (excluding Class B and Unclassified Misdemeanors as defined above) after this Contract is fully executed, the County shall have the right to terminate this Agreement immediately and without penalty. An "affiliated company" as used herein means any affiliate which is a partnership, corporation, proprietorship, association or other entity (i) in which a 50% or greater ownership interest (as defined below) is directly or indirectly held by the Contractor or any of its management personnel (as defined below) or directors, (ii) which directly or indirectly holds 50% or more of the ownership interest in the Contractor, (iii) in which an aggregate 20% or greater ownership interest is directly or indirectly held by one or more shareholders (or partners or proprietors, in the case of a partnership or proprietorship) which or who in the aggregate hold a 20% or greater ownership interest in the Contractor, or (iv) which, whether by Contract or otherwise, directly or indirectly controls, is controlled by or is under common control with the Contractor. An "ownership interest" means the ownership, whether legally or beneficially, of the stock of or assets employed by a corporation, of a partnership interest in or assets employed by a partnership or of a similar interest in or assets employed by any other entity. "Management personnel" means executive officers and all other persons, whether or not officers or employees, who perform policy-making functions similar to those of executive officers.

The Contractor represents that at the time of execution of this Contract, no individual or entity, as described above, has been convicted of a crime during the five (5) year period preceding the execution of this Contract.

The parties hereto recognize that it is the goal of Westchester County to use its best efforts to encourage, promote and increase participation of business enterprises owned and controlled by persons of color or women (MBE/WBE) in contracts or projects funded by all Departments of the County and to effectively and efficiently monitor such participation. Therefore, the Contractor agrees to complete the MBE/WBE Questionnaire, which is attached hereto as Schedule "A," in furtherance of this goal and in accordance with Local Law No. 27-1997.

It is recognized and understood by the parties that this Contract is subject to appropriation by the Westchester County Board of Legislators. The County shall have no liability under this Contract beyond the funds, if any, that are appropriated and available for payment of the amounts due under this Contract. Notwithstanding the foregoing, the County will do all things lawfully within its power to obtain, maintain and properly request and pursue funds from which payments under this Contract may be made.

The parties hereto for themselves, their legal representatives, successors and assigns, expressly agree that any legal action or proceeding that may arise out of or relating to this Contract shall be brought and maintained only in the courts of the State of New York ("New York State Court") located in the County of Westchester. With respect to any action between the County and Contractor in New York State Court, the Contractor hereby expressly waives and relinquishes any rights it may otherwise have (i) to move to dismiss on grounds of *forum non*

conveniens; (ii) to remove to Federal Court; and (iii) to move for a change of venue to a New York State Court outside of Westchester County.

This Contract and its terms, covenants, obligations, conditions and provisions shall be binding upon all the parties hereto, their legal representatives, successors and assigns.

SAMPLE

This Contract shall not be enforceable until it is signed by all parties and approved by the Office of the County Attorney.

IN WITNESS WHEREOF, the parties hereto have executed this agreement, THE COUNTY OF WESTCHESTER pursuant to law by:

_____ its **Commissioner** _____

and the CONTRACTOR:

By: _____ its _____
(Type or Print Name) (Title)

THE COUNTY OF WESTCHESTER:

By: _____
Commissioner

CONTRACTOR:

By: _____
(Signature)

ATTEST:

(SEAL)

By: _____
(Signature)

Recommended:

Deputy Commissioner of Public Works

Approved as to form and manner of execution
this ____ day of _____, 200__

County Attorney

CONTRACTOR'S ACKNOWLEDGMENT
(If Corporation)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this ____ day of _____, 200__, before me personally came _____ to me known, and known to me to be the _____ of _____, the Corporation described in and which executed the within instrument, who being by me duly sworn did depose and say that the said _____ resides at _____ and that he/she is the _____ of said Corporation and that he/she signed his/her name thereto by order of the Board of Directors of said Corporation and, if operating under any trade name, that the certificate required by the New York State General Business Law Section 130 has been filed with the Secretary of State of the State of New York.

Notary Public

CONTRACTOR'S ACKNOWLEDGMENT
(If Individual)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this ____ day of _____, 200__, before me personally came _____ to me known, and known to me to be the same person described in and who executed the within instrument and duly acknowledged to me that he/she executed the same for the purpose herein mentioned and, if operating under any trade name, that the certificate required by the New York State General Business Law Section 130 has been filed with the County Clerk of Westchester County.

Notary Public

CONTRACTOR'S ACKNOWLEDGMENT
(If Co-Partnership)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this ____ day of _____, 200__, before me personally came _____ to me known, and known to me to be a member of the firm of _____ and the person described in, and who executed the within instrument in behalf of said firm, and he/she acknowledged to me that he/she executed the same in behalf of, and as the act of said firm for the purposes herein mentioned and, if operating under any trade name, that the certificate required by the New York State General Business Law Section 130 has been filed with the County Clerk of Westchester County.

Notary Public

CERTIFICATE OF AUTHORITY

I, _____
(Officer other than officer signing contract)

certify that I am _____ of
(Title)

the _____
(Name of Corporation)

organized and in good standing under the _____
(Law under which organized)

named in the foregoing agreement; that _____
(Person executing agreement)

who signed said agreement on behalf of the Contractor was, at the time of execution the
_____ of the Corporation; that said agreement was duly
(Title of such person)

signed for and on behalf of said Corporation by authority of its Board of Directors, thereunto
duly authorized and is in full force and effect at the date hereof.

(Signature)

(SEAL)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this ____ day of _____, 200__, before me personally came
_____ to me known, and known to me to be the
_____ of _____,
the Corporation described in and which executed the above certificate, who being by me duly
sworn did depose and say that the said _____ resides at
_____ and that he/she is
_____ of said Corporation and knows the Corporate Seal of the said
Corporation; that the seal affixed to the above certificate is such Corporate Seal and was so
affixed by order of the Board of Directors of said Corporation, and that he/she signed his/her
name thereto by like order.

Notary Public

STATE OF NEW YORK)
) ss.:
COUNTY OF)

Notary Public

PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we

(hereinafter called the "Principal"), and the _____

_____ a Corporation created and existing under the laws of the State of _____

and having its principal office at _____
in the City of _____ (hereinafter called the "Surety"), are held and
firmly bound unto The County of Westchester (hereinafter called the "Obligee") in the penal sum
of-----**DOLLARS**-----**AND**-----/100-----
--[\$]

lawful money of the United States of America, for the payment of which, well and truly
to be made, the said Principal binds itself, (himself, themselves) and its (his, their) successors
and assigns, and the said Surety binds itself and its successors and assigns, all jointly and
severally, firmly by these presents. Said penal sum shall apply separately and independently, in
its total amount, to the payment provision and the performance provision of this Bond shall not
reduce or limit the right of the Obligee to recover under the other said provision.

Signed, sealed and dated this _____ day of _____, 200__.

WHEREAS, said Principal has entered into a certain written contract with said Obligee, dated
this _____ day of _____, 200__, (hereinafter called the "Contract")

For ----**CONTRACT #** _____ a copy of which Contract is hereto annexed and
hereby made a part of this bond as if herein set forth in full.

NOW THEREFORE, THE CONDITIONS OF THE ABOVE OBLIGATIONS ARE SUCH THAT, if the said Principal, and its (his, their) successors or assigns, or any or either of them shall,

(1) well and truly and in good, sufficient and workmanlike manner, perform or cause to be performed such Contract, and any amendment or extension of or addition thereto, and each and every of the covenants, promises, agreements and provisions therein stipulated and contained to be performed by said Principal, and complete the same within the period therein mentioned, and in each and every respect, comply with the conditions therein mentioned to be complied with by said Principal, and fully indemnify and save harmless the Obligees from all costs and damages which it may suffer by reason of failure so to do and fully reimburse and repay the Obligees all outlay and expense which it may incur in making good any such default, and

(2) also pay or cause to be paid the wages and compensation for labor performed and services rendered of all persons engaged in the prosecution of the work provided for therein, whether such persons by agents, servants or employees of the Principal, and of its (his, their) successors or assigns, or any Subcontractor or of any assignee thereof, including all persons so engaged who perform the work of laborers or of mechanics regardless of any contractual relationship between the Principal, or its (his, their) successors or assigns, or any Subcontractor or any designee thereof, and such laborers or mechanics, but not including office employees not regularly stationed at the site of the work, and further, shall pay or cause to be paid all lawful claims of Subcontractors and of materialmen and other third persons out of or in connection with said Contract and the work, labor, services, supplies and material furnished in and about the performance and completion thereof, then these obligations shall be null and void, otherwise they shall remain in full force and effect.

PROVIDED, however, that this bond is subject to the following additional conditions and limitations:

- (a) All persons who have performed labor or rendered services, as aforesaid, all Subcontractors, and all persons, firms, corporations, including materialmen and third persons, as aforesaid, furnishing work, labor, services, supplies and material under or in connection with said Contract or in or about the performance and completion thereof, shall have a direct right of action (subject to the prior right of the Obligees under any claim which it may assert against the Principal or its (his, their) successors and assigns, and/or the Surety and its successors and assigns) against the Principal and its (his, their) successors and assigns on this bond, which right of action shall be asserted in proceedings instituted in the State in which such work, labor, services, supplies or material was performed, rendered or furnished or where work, labor, services, supplies or material has been performed, rendered or furnished, as aforesaid, in more than one State, than in any such State. Insofar as permitted by the laws of such State, said right of action shall be asserted in a proceeding instituted in the name of Obligees to the use and benefit of the person, firm or corporation instituting such action and of all other persons, firms and corporations having claims hereunder, and any other person, firm or corporation having a claim hereunder shall have the

right to be made a party to such proceedings (but not later than twelve months after the performance of said Contract and final settlement thereof) and to have such claim adjudicated in such action and judgment rendered thereon. Prior to the institution of such a proceeding by a person, firm or corporation in the name of the Obligee, as aforesaid, such person, firm or corporation shall furnish the Obligee with a Bond of Indemnity for costs, which Bond shall be in an amount satisfactory to the Obligee.

- (b) The Surety or its successors or assigns shall not be liable hereunder for any damages or compensation recoverable under any worker's compensation or employer's liability statute.
- (c) In no event shall the Surety or its successors or assigns be liable under either the foregoing clause (1) or the foregoing clause (2) for a greater sum than the penalty of this Bond provided; however, that said penalty is separately applicable, in its total amount to each of the foregoing clauses (1) and (2), or subject to any suit, action or proceeding hereon that is instituted by any person, firm or corporation under the provisions of the above section (a) later than twelve months after the complete performance of said Contract and final settlement thereof.

The Principal, for itself (himself, themselves) and its (his, their) successors and assigns, and the Surety, for itself and its successors and assigns, do hereby expressly waive any objections that might be interposed as to the right of the Obligee to require a Bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either of them might interpose to an action brought hereon by any person, firm or corporation, including Subcontractors, materialmen, and third persons, for work, labor, services, supplies or material performed, rendered or furnished as aforesaid, upon the ground that there is no law authorizing the said Obligee to require the foregoing provision to be placed in this Bond.

And Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligations of said Surety and of its successors and assigns and this Bond shall in no way be impaired or affected by an 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 provision thereof, or by an assignment, subletting or other transfer thereof, or of any part thereof, or of any work to be performed, or of any moneys due or to become due thereunder; and the said Surety, for itself and its successors and assigns, does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to (executors, administrators), successors, assigns, Subcontractors, and other transferees, shall have the same effect as to said Surety and its successors and assigns, as though done or omitted to be done by and in relation to said Principal.

And Surety, for value received, hereby stipulates and agrees, if requested to do so by Obligee, to fully perform and complete the work to be performed under the Contract, pursuant to the terms, conditions and covenants thereof, if for any cause, the Principal fails or neglects to so

fully perform and complete such Work. The Surety further agrees to commence such Work of Completion within twenty-five (25) calendar days after written notice thereof from the Oblige, and to complete such Work within twenty-five (25) calendar days from the expiration of the time allowed the Principal in the Contract for the completion of such Work.

WITNESSETH our hands and seals this ____ day of _____, 200__.

PRINCIPAL:

By: _____

(Signature)

(SEAL)

ATTEST:

(Surety)

By: _____

(Signature)

(SEAL)

ATTEST:

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.

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.

BOND

BOND

CONTRACTOR'S ACKNOWLEDGMENT
(If Corporation)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this ____ day of _____, 200__, before me personally came _____ to me known, and known to me to be the _____ of _____, the Corporation described in and which executed the within instrument, who being by me duly sworn did depose and say that the said _____ resides at _____ and that he/she is the _____ of said Corporation and knows the Corporate Seal of the said Corporation; that the seal affixed to the within instrument is such Corporate Seal and that it was so affixed by order of the Board of Directors of said Corporation and that he/she signed his/her name thereto by like order.

Notary Public

CONTRACTOR'S ACKNOWLEDGMENT
(If Individual)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this ____ day of _____, 200__, before me personally came _____ to me known, and known to me to be the same person described in and who executed the within instrument and he/she duly acknowledged to me that he/she executed the same for the purpose herein mentioned.

Notary Public

CONTRACTOR'S ACKNOWLEDGMENT
(If Co-Partnership)

STATE OF NEW YORK)
) ss.:
COUNTY OF)

On this ____ day of _____, 200__, before me personally came _____ to me known, and known to me to be a member of the firm of _____ and the person described in, and who executed the within instrument in behalf of said firm, and acknowledged to me that he/she executed the same in behalf of, and as the act of said firm for the purposes herein mentioned.

Notary Public

BOND

STATE OF NEW YORK)
) ss.:
COUNTY OF)

Notary Public

PROJECT LABOR AGREEMENT (PLA)

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
Division of Engineering

PROJECT LABOR AGREEMENT
(Contract No. *{Insert Contract Number}*)

COVERING

CONSTRUCTION PERFORMED

ON BEHALF OF

WESTCHESTER COUNTY, NEW YORK

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**PROJECT LABOR AGREEMENT
COVERING CONSTRUCTION WORK PERFORMED
ON BEHALF OF WESTCHESTER COUNTY, NEW YORK**

ARTICLE 1 - PREAMBLE

WHEREAS, *{Insert Name of Contractor}* (the “Contractor”) on behalf of itself, and reflecting the objectives of the owner, **Westchester County, New York** (the “County”), desires to provide for the efficient, safe, quality, and timely completion of the following construction project: *{Insert Contract Title}* (the “Project”) in a manner designed to afford the lowest reasonable costs to the County and the public it represents, and the advancement of public policy objectives;

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

1. avoiding the costly delays of potential strikes, slowdowns, walkouts, picketing and other disruptions arising from work disputes and promote labor harmony and peace for the duration of the Project;
2. standardizing the terms and conditions governing the employment of labor on the Project;
3. permitting wide flexibility in work scheduling and shift hours and times;
4. receiving negotiated adjustments to work rules and staffing requirements from those which otherwise might control;
5. providing comprehensive and standardized mechanisms for the settlement of work disputes, including but not limited to, those relating to jurisdiction;
6. ensuring a reliable source of skilled and experienced labor;
7. furthering public policy objectives as to improved employment opportunities for minorities, women and the economically disadvantaged in the construction industry;
8. minimizing potential losses of revenues through timely completion of contracts;
9. expediting the construction process and otherwise minimizing the inconveniences of citizens of the County; and

WHEREAS, the parties desire to maximize Project safety conditions for both workers and the public;

NOW, THEREFORE, the parties enter into this Agreement:

SECTION 1 - PARTIES TO THE AGREEMENT

This is a Project Labor Agreement (“Agreement”) entered into by and between the Contractor, on behalf of itself and its successors, assigns and its subcontractors engaged in On-Site Project Work as defined in Article 3; and by the Building and Construction Trades Council of Westchester and Putnam Counties, New York AFL-CIO, on behalf of itself and all of its affiliated Local Unions that perform On-Site Project Work and their members.

ARTICLE 2 - GENERAL CONDITIONS

SECTION 1 - DEFINITIONS

Throughout this Agreement, “Council” shall refer to the Building and Construction Trades Council of Westchester and Putnam Counties, New York AFL-CIO. “Local Unions” shall refer to all of the Council’s affiliated Local Unions that perform On-Site Project Work and their members. “Contractor(s)” shall include the Contractor, all other contractors who sign a similar Project Labor Agreement in connection with the Project and their subcontractors of whatever tier, engaged in On-Site Project Work within the scope of this Agreement as defined in Article 3.

SECTION 2 - CONDITIONS FOR AGREEMENT TO BECOME EFFECTIVE

This Agreement shall not become effective unless each of the following conditions is met: (1) the Agreement is signed by the Council on behalf of itself and all of its affiliated Local Unions that perform On-Site Project Work; (2) the Agreement is signed by the Contractor; and (3) the Agreement is approved by the County.

SECTION 3 - ENTITIES BOUND & ADMINISTRATION OF AGREEMENT

This Agreement shall be binding on the Council, the Local Unions and the Contractors performing On-site Project Work, including site preparation and staging areas, 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 each and every one of their subcontractors, of whatever tier, become bound by this Agreement with respect to subcontracted work performed within the scope of Article 3. This Agreement shall be administered by the Contractor, on behalf of itself and its subcontractors. In the event a

Contractor desires to review the provisions of a Local Union's collective bargaining agreement, that Contractor shall request a copy of same from the Council and the Council shall provide same without delay.

SECTION 4 - SUPREMACY CLAUSE

This Agreement together with the applicable collective bargaining agreements of the Local Unions, copies of which can be obtained from the Council, represents the complete understanding of all signatories and supersedes any national agreement, local agreement or collective bargaining agreement of any type which would otherwise apply to this Project, in whole or in part. Where a subject covered by the provisions, explicit or implicit, of this Agreement is also covered by the collective bargaining agreements of one or more of the Local Unions, the provisions of this Agreement shall prevail. It is further understood that no Contractor or subcontractor shall be required to sign any other agreement with the Council or the Local Unions as a condition of performing work on this Project. No practice, understanding or agreement between a Contractor and a Local Union which is not set forth or referenced in this Agreement shall be binding on this Project unless endorsed in writing by the Contractor or subcontractor.

SECTION 5 - LIABILITY

The liability of any Contractor or subcontractor and the liability of any Local Union under this Agreement shall be several and not joint. The Contractor and any subcontractor 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 Local Union.

SECTION 6 - THE COUNTY

The County requires in its bid specifications that all successful bidders become bound by and signatory to this Agreement for work within the scope of Article 3. In addition, all of their subcontracts shall provide that their subcontractors are subject to all terms and conditions set forth in this Agreement as if signatories thereto. The County is not a party to this Agreement and shall not be liable in any manner under this Agreement. It is understood that nothing in this Agreement shall be construed as limiting the sole discretion of the County in determining which Contractors shall be awarded contracts for Project work; nor as limiting any of the rights or remedies of the County as set forth in any and all of the Contract Documents that pertain in any way to the Project. It is further understood that the County has sole discretion at any time to terminate, delay or suspend the work, in whole or in part, on this Project.

SECTION 7 - AVAILABILITY & APPLICABILITY TO ALL SUCCESSFUL BIDDERS

The Local Unions agree that this Agreement will be made available to, and will fully apply to any successful bidder for Project work who becomes signatory hereto, without regard to whether that successful bidder performs work at other sites on either a union or non-union basis and without regard to whether employees of such successful bidder are, or are not, members of any union. This Agreement shall not apply to the work of any contractor or subcontractor which is performed at any location other than the Project site, as defined in Article 3, Section 1.

ARTICLE 3 - SCOPE OF THIS AGREEMENT

The Project work covered by this Agreement shall be as defined and limited by the following sections of this Article.

SECTION 1 - THE WORK

This Agreement shall only apply to On-Site Project Work performed in connection with the Project.

“On-Site Project Work” shall be defined to include Project work performed at the Project site and preparation and staging areas located within 15 miles of the Project site.

SECTION 2 - EXCLUDED EMPLOYEES

The following persons are not subject to the provisions of this Agreement, even though performing On-Site Project Work:

- a) Superintendents, supervisors (excluding field engineers/supervisors, general and forepersons specifically covered by a Local Union’s collective bargaining agreement), engineers, inspectors and testers, 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 County, or of any State agency, authority or entity or employees of any municipality or other public employer;
- c) Employees and entities engaged in off-site manufacture, modifications, repair, maintenance, assembly, painting, handling or fabrication of components, materials, equipment or machinery or involved in deliveries to and from the Project site, excepting local deliveries of all major

construction materials including fill, ready mix concrete, asphalt and sub-base stone/gravel materials which are covered by this Agreement;

- d) Employees of the Contractor, other contractors or subcontractors excepting those performing manual, on-site construction labor who will be covered by this Agreement;
- e) Employees engaged in on-site equipment maintenance/warranty work. When a Contractor has on site an employee already certified by the relevant manufacturer to make warranty repairs on that Contractor's equipment, that employee shall be used; when a Contractor has on site an employee already qualified to make warranty repairs, although not certified by the equipment manufacturer to do so, that employee shall be used to make repairs working under the direction of a manufacturer certified warranty representative. Notwithstanding the foregoing, if a Contractor, in order to satisfy the warranty requirements of a manufacturer must utilize a person or entity designated by the manufacturer, it may do so without coverage under this Agreement;
- f) Employees engaged in laboratory or specialty testing or inspections whether on or off-site.
- g) Employees engaged in geophysical testing (whether land or water) other than boring for core samples;
- h) Employees engaged in ancillary Project work performed by third parties such as electric utilities, gas utilities, telephone companies, and railroads.

SECTION 3 - NON-APPLICATION TO CERTAIN ENTITIES

This Agreement shall not apply to the parents, affiliates, subsidiaries, or other joint or sole ventures of any Contractors which do not perform work at this Project. It is agreed, for the purposes of this Agreement only, that this Agreement does not have the effect of creating any joint employment, single employer or alter ego status among the County and the Contractors. This Agreement shall further not apply to the County or any other state agency, authority, or other municipal or public entity and nothing contained herein shall be construed to prohibit or restrict the County or its employees or any other state authority, agency or entity and its employees from performing on or off-site work related to the Project.

SECTION 4 - COUNTY LIABILITY

The County shall not be liable, directly or indirectly, to any party for any act or omission of the Contractor, any other contractors or subcontractors, the Council or Local Unions, including but not limited to, any violation or breach of this Agreement by any of the aforementioned.

ARTICLE 4 - UNION RECOGNITION AND EMPLOYMENT

SECTION 1 - PRE-HIRE RECOGNITION

The Contractors recognize the Local Unions as the sole and exclusive bargaining representatives of all trade employees who are performing On-Site Project Work within the scope of this Agreement as defined in Article 3.

SECTION 2 - UNION'S REFERRAL

- A. The Contractors agree to hire trade employees covered by this Agreement through the job referral system and hiring halls (where the referrals meet the qualifications set forth in items 1, 2 and 4 of subparagraph B below) established in the collective bargaining agreements of the applicable Local Unions listed in Schedule A. Notwithstanding this, the Contractors shall have the sole right to determine the competency of all referrals; the number of employees required; the selection of employees to be laid off (except as provided in Article 5, Section 3); and to reject any applicant referred by a Local Union, subject to the show-up payments required in the applicable Local Union's collective bargaining agreement. In the event that a Local Union is unable to fill any request for qualified employees within a 48 hour period after such requisition is made by the Contractor (Saturdays, Sundays and Holidays excepted), the 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 applicable Local Union of trade employees hired within its jurisdiction from any source other than referral by the Local 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 On-Site Project Work and who meet the following qualifications as determined by a committee of 3 persons (the "Committee") designated, respectively, by the applicable Local Union, the Contractor and a mutually selected third party or, in the absence of agreement, the permanent arbitrator (or designee) designated in Article 7:
1. possess licenses required by New York State law for the On-Site Project Work to be performed by that individual;
 2. have worked a total of at least 1000 hours in the applicable construction trade during the prior 3 years;

3. were on the Contractor's active payroll for at least 60 out of the 180 calendar days prior to the contract award;
 4. have demonstrated ability to safely perform the basic functions of the applicable trade.
- C. No more than 12 per centum of the employees covered by this Agreement, per Contractor by trade, shall be hired through the special provisions above (any fraction shall be rounded to the next highest whole number).
- D. The Committee may also allow a Contractor, subject to the above per centum, to employ apprentice equivalents to afford an opportunity to minority, women or economically disadvantaged persons for entry into the construction industry outside of the formal apprenticeship program.

SECTION 3 - NON-DISCRIMINATION IN REFERRALS

The Local Unions represent that their hiring halls and referral systems 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 AND FEMALE REFERRALS

In the event a Local Union either fails, or is unable, to refer qualified minority or female applicants in percentages equaling Project affirmative action goals as set forth in the County's Project specifications, the Contractor may employ qualified minority or female applicants from any other available source.

SECTION 5 - CROSS AND QUALIFIED REFERRALS

The Local Union 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 trade employees to fulfill the requirements of the Contractor.

SECTION 6 - UNION DUES

All employees covered by this Agreement shall be subject to the union security provisions contained in the applicable Local Unions' collective bargaining agreements as amended from time to time, but only for the period of time during which they are performing On-Site Project Work and only to the extent of rendering payment of the applicable monthly union dues uniformly required for union membership in the applicable Local Union which represents the trade in which the employee is performing On-Site Project Work. No employee shall be discriminated against at the Project site because of the employee's union membership or lack thereof. In the case of unaffiliated employees, the dues payment will be received by the Local Unions as an agency shop fee.

SECTION 7 - TRADE FOREPERSONS AND GENERAL FOREPERSONS

- A. The selection of trade 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 Local Union's collective bargaining agreement. All forepersons shall take orders exclusively from the designated Contractor representatives. Trade forepersons shall be designated as working forepersons at the request of the Contractor, except when an existing Local Union's collective bargaining agreement prohibits a foreperson from working when the tradepersons he is leading exceed a specified number.
- B. There will be no non-productive employees of any title on the Project.

ARTICLE 5 - UNION REPRESENTATION

SECTION 1 - LOCAL UNION REPRESENTATIVE

Each Local Union representing employees who perform On-Site Project Work shall be entitled to designate in writing (copy to Contractor) one representative, and/or the Business Manager, who shall be afforded access to the Project. The Contractor shall provide a copy of such notification to each of its subcontractors.

SECTION 2 - STEWARDS

- A. Each Local Union shall have the right to designate a working journeyman as a Steward and an alternate, and shall notify 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 trade classifications. There will be no non-working Stewards on the Project.

- B. In addition to their work as employees, Stewards 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 Contractor, and, if applicable, subcontractors of the Contractor, but not with the employees of any other contractor. The Contractor will not 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 provision in a Local Union's collective bargaining agreement 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 Local Union's collective bargaining agreement, such provisions shall be recognized to the extent the Steward possesses the necessary qualifications to perform the work required. In any case in which a Steward is discharged or disciplined for just cause, the Local Union involved shall be notified immediately by the Contractor.

ARTICLE 6 - MANAGEMENT'S RIGHTS

SECTION 1 - RESERVATION OF RIGHTS

Except as expressly limited by a specific provision of this Agreement, the Contractor retains full and exclusive authority for the management of the Project operations including, but not limited to: the right to direct the work force, including determination as to the number to be hired and the qualifications therefore; the promotion, transfer, and layoff of its employees; the discipline or discharge for just cause of its employees; the assignment and schedule of work; the promulgation of reasonable Project work rules; 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, 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, tools or other labor-saving devices. Contractors may, without restriction, install or use materials, supplies or equipment regardless of their source. The on-site installation or application of such items shall be performed by the trade 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 not On-Site Project Work.

ARTICLE 7 - WORK STOPPAGES AND LOCKOUTS

SECTION 1 - NO STRIKES - NO LOCKOUTS

There shall be no strikes, sympathy strikes, picketing, work stoppages, slowdowns, hand billing, demonstrations or other disruptive activity at the Project for any reason by any Local Union or employee against any Contractors or employer while performing On-Site Project Work. There shall be no other Local Union, or concerted or employee activity which disrupts or interferes with the operation of the Contractors or the County. Failure of any Local 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 the On-Site Project Work shall be deemed a violation of this Article. There shall be no lockout at the Project by any Contractor. Contractors and Local Unions shall take all steps necessary to ensure compliance with this Section 1 and to ensure uninterrupted construction for the duration of this Agreement.

SECTION 2 - DISCHARGE FOR VIOLATION

Contractors 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 the Contractor contends that any Local Union has violated this Article, it will notify the President of the Council advising of such fact, with copies of the notification to the Local Union. The President of the Council shall instruct, order and otherwise use its best efforts to cause the employees and/or the Local

Unions to immediately cease and desist from any violation of this Article. The Council, in complying with these obligations, shall not be liable for the unauthorized acts of a Local Union or its members.

SECTION 4 - EXPEDITED ARBITRATION

Any Contractor or Local 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 the American Arbitration Association to appoint an Arbitrator under this expedited arbitration procedure. Copies of such notification will be simultaneously sent to the alleged violator and, if a Local Union is alleged to be in violation, its International Union, the Council, and the Contractor.
- B. Upon appointment in accordance with the rules and regulations of the American Arbitration Association for an expedited arbitration proceeding, the Arbitrator shall thereupon, after notice as to time and place to the Contractor, the Local Union involved, and the Council 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 to the Council required by Section 3, above.
- C. All notices pursuant to this Article may be by telephone, telegraph, hand delivery, or fax, confirmed by overnight delivery, to the Arbitrator, Contractor, the involved Local Union and the Council. 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 Local 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 the Local Union involved. The Arbitrator shall have no authority to consider any matter in justification, explanation or mitigation of such violation or to award damages, which 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. 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 Local Union or Contractor involved. In any court proceeding to obtain a temporary or preliminary order enforcing the Arbitrator's award as issued under this expedited procedure, the involved Local Union and Contractor waive their right to a hearing and agree that such proceedings may be ex parte, provided notice is given to opposing counsel. Such agreement does not waive any party's right to participate in a hearing for a final court order of enforcement or in any contempt proceeding.
- F. 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 Local Unions to whom they accrue.
- G. The fees and expenses of the Arbitrator shall be equally divided between the involved Contractor and Local Union.

SECTION 5 - ARBITRATION OF DISCHARGES

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 Project Labor Management Committee (the "Labor Management Committee") will meet on a regular basis to: 1) promote harmonious relations among the contractors and Unions; 2) enhance safety awareness, cost effectiveness and productivity of construction operations; 3) protect the public interests; 4) discuss matters relating to staffing and scheduling with safety and productivity as considerations; 5) review Affirmative Action and equal employment opportunity matters pertaining to the Project; and 6) discuss such other matters as may be desirable or necessary in furtherance of the expeditious completion of the Project.

SECTION 2 - COMPOSITION

The Labor Management Committee shall be composed of one designee each of the Council, the Contractors and the Local Unions involved in the issues being discussed. The Labor Management Committee may conduct business through mutually agreed 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 described below; provided, in all cases, that the question, dispute or claim arose during the term of this Agreement.

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. To be timely, such notice of the grievance must be given within 14 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 14 calendar days after a timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving party, may, within 14 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 Contractor as creating a precedent.
- (b) Should any Contractor or Local Union have a dispute (excepting jurisdictional disputes or alleged violations of Article 7, Section 1) with any other Contractor or Local Union and after conferring a settlement is not reached within 14 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:

The Business Manager or designee of the involved Local Union, together with representatives of the Council and the involved Contractor, shall meet in Step 2 within 14 calendar days of service of the written grievance to arrive at a satisfactory settlement.

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) to the American Arbitration Association. The Labor Arbitration Rules of the American Arbitration Association shall govern the appointment and 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 arbitration 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 Contractor and the 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 may provide retroactivity of any kind exceeding 60 calendar days prior to the date of service of the written grievance on the Contractor or Local Union.

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 On-Site Project Work assignments shall be made pursuant to law.

SECTION 3 - PROCEDURE FOR SETTLEMENT OF JURISDICTIONAL DISPUTES

- A. Any Local Union having a jurisdictional dispute with respect to On-Site Project Work assigned to another Local Union will submit the dispute in writing to the Administrator, Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (“the Plan”) within 72 hours and send a copy of the letter to the Local Union and the International Union involved, the President of the Council, the County and the Contractor involved. Upon receipt of a dispute letter from any Local Union, the Administrator will invoke the procedures set forth in the Plan to resolve the jurisdictional dispute. The jurisdictional dispute letter shall contain the information described in Article IV of the Plan.
- B. Within 5 calendar days of receipt of the dispute letter, there shall be a meeting of the Contractor involved, the Local Unions involved and the President of the Council for the purpose of resolving the jurisdictional dispute.
- C. If the dispute remains unresolved after this meeting, the parties will proceed to final and binding arbitration in accordance with the principles and procedures set forth in the rules of the Plan.
- D. The Arbitrator will render a short-form decision within 5 days of the hearing based upon the evidence submitted at the hearing, with a full written decision to follow within 30 days of the close of the hearing.
- E. This Jurisdictional Dispute Resolution Procedure will only apply to On-Site Project Work performed by Local Unions. A representative of the County and the International Union involved may also attend the meeting.
- F. Any Local Union involved in a jurisdictional dispute on this Project shall continue working in accordance with Section 2 above and without disruption of any kind.
- G. Copies of the Plan will be provided by the Council upon request.

SECTION 4 - AWARD

Any jurisdictional award pursuant to Section 3 shall be final and binding on the disputing Local Unions and the involved Contractor on this Project only, and may be enforced in any court of competent

jurisdiction. Such award or resolution shall not establish a precedent on any other construction work not covered by this Agreement. In all disputes under this Article, the involved Contractors shall be considered parties in interest.

SECTION 5 - LIMITATIONS

The Jurisdictional Dispute Arbitrator shall have no authority to assign work to a double crew, that is, to more employees than the minimum required by the involved Contractor to perform the work involved; nor to assign the work to employees who are not qualified to perform work involved; nor to assign work being performed by non-union employees to union employees. This does not prohibit the establishment, with the agreement of the involved Contractor, of composite crews where more than one employee is needed for the job. The aforesaid determinations shall decide only to whom the disputed work belongs.

SECTION 6 - NO INTERFERENCE WITH WORK

There shall be no interference or interruption of any kind with the On-Site Project Work while any jurisdictional dispute is being resolved. The On-Site Project Work shall proceed as assigned by the involved 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 base hourly wage rates for those classifications as specified in the applicable Local Unions' collective bargaining agreements, as they may be amended during the term of this Agreement. Recognizing, however, that special conditions may exist or occur on the Project, the parties, by mutual agreement may establish rates and/or hours for one or more classifications which may differ from the applicable collective bargaining agreements. Parties to such agreements shall be the Contractor involved, the involved Local Unions and the Council.

SECTION 2 - EMPLOYEE BENEFIT FUNDS

The Contractors agree to pay contributions on behalf of all employees covered by this Agreement to the established employee benefit funds in the amount designated in the appropriate Local Unions' collective bargaining agreements; provided, however, that the involved Contractors and the Local Unions agree that

only such bona fide employee benefits as are explicitly required under Section 220 of the New York State Labor Law shall be included in this requirement and paid by the Contractors on this Project. Bona fide jointly trusted fringe benefit plans established or negotiated through collective bargaining during the life of this Agreement may be added if similarly protected under Section 220. Contractors shall not be required to contribute to non-Section 220 benefits, trusts or plans.

The Contractors agree to be bound by the written terms of the legally-established Local Union collective bargaining agreement and/or 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 work done on this Project and only for those employees to whom this Agreement requires such benefit payments. Copies of such Trust Agreements will be provided by the Council upon request.

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

SECTION 1 - WORK WEEK AND WORK DAY

- A. The standard work week shall consist of 40 hours of work at straight time rates per one of the following schedules:
 - i.) Five-Day Work Week: Monday-Friday; 5 days, 8 hours plus 1/2 hour unpaid lunch period each day.
 - ii.) Four-Day Work Week: Monday-Thursday; 4 days, 10 hours plus 1/2 hour unpaid lunch period each day.
- B. 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 2:00 p.m. and 7:30 p.m. Starting and quitting times shall occur at the staging areas as may be designated by the Contractor.
- C. Scheduling – The Contractor shall have the option of scheduling either a five-day or four-day work week and the work day hours consistent with the Project requirements, the Project schedule and minimization of interference. When conditions beyond the control of the Contractor, such as severe weather, power failure, fire or natural disaster, prevent the performance of On-Site Project Work on a regularly scheduled work day, the Contractor may, with mutual agreement of the involved Local Unions on a trade-by-trade basis, schedule work on Friday (where on four 10s) or Saturday (where on five 8s) during that calendar week in which a work day was lost, at straight

time pay, provided that the employees involved work a total of 40 hours or less during that work week. When conditions on the Project cause the Contractor to stop work or be unable to commence work on the day in question, the Contractor will notify the Local Unions and the employees at that time that Friday or Saturday, as the case may be, will be a make-up day for the affected operation(s) and the Friday or Saturday work will then be at straight time for the day or any portion of the work day that work was stopped. The balance of the day on Friday or Saturday, if any, will be at time and one-half (1/2) the straight time rate of pay. If the Contractor seeks to cancel a day's work in advance of that day and to schedule the following Friday or Saturday as a make-up day, the determination of whether the Contractor is unable to perform the affected work operation(s) shall be jointly made between the Contractor and the involved Local Unions, the Local Unions' agreement not to be unreasonably withheld.

- D. Notice – Contractors shall provide not less than five (5) days prior notice to the Local Unions as to the work week and work hours scheduled to be worked or such lesser notice as may be mutually agreed upon.

SECTION 2 - OVERTIME

Overtime pay for hours outside of the standard work week and work day, described in Paragraph A above, shall be paid in accordance with the applicable Local Unions' collective bargaining agreements. There will be no restriction upon the Contractor's scheduling of overtime or the non-discriminatory designation of employees who work. There shall be no pyramiding of overtime pay under any circumstances. The Contractor shall have the right to schedule work so as to minimize overtime.

SECTION 3 - SHIFTS

- A. Flexible Schedules - Scheduling of shift work shall remain flexible in order to meet Project schedules and existing Project conditions including the minimization of interference with traffic. It is not necessary to work a day shift in order to schedule a second shift. Shifts must be worked a minimum of five consecutive work days, must have prior approval of the Contractor and/or subcontractor, and must be scheduled with not less than five work days notice to the Local Union.
- B. Second Shift - The second shift (starting between 2 p.m. and 8 p.m.) shall consist of 8 hours work (or 10 hours of work) for an equal number of hours pay at the straight time rate plus 15% in lieu of overtime and exclusive of a 1/2 hour unpaid lunch period. Where specifically required by the applicable Local Unions' collective bargaining agreements, employees on second shift, where there are no first shift employees scheduled for that trade, will be paid at time and one-half rates

for such second shift work, but without any shift differential. In all other cases, the first sentence of this paragraph B shall apply.

- C. Flexible Starting Times - Shift starting times will be adjusted by the Contractor as necessary to fulfill Project requirements subject to the notice requirements of Paragraph A.
- D. Four Tens - When working a four-day work week, the standard work day shall consist of 10 hours work for 10 hours of pay at the straight time rate exclusive of an unpaid 1/2 hour meal period and regardless of the starting time. This provision is applicable to night shifts only, and such night shifts are subject to the shift differential in paragraph B above.

SECTION 4 - HOLIDAYS

- A. Schedule - There shall be eight (8) recognized holidays on the Project:

New Year's Day	Labor Day
President's Day	Veterans Day
Memorial Day	Thanksgiving Day
Fourth of July	Christmas Day

All said holidays shall be observed on the dates designated by New York State law. In the absence of such designation, they shall be observed on the calendar date except those holidays which occur on Sunday shall be observed on the following Monday.

- B. Payment - Regular holiday pay, if any, and/or premium pay for work performed on such a recognized holiday shall be in accordance with the applicable Local Unions' collective bargaining agreements.
- C. Exclusivity - No holidays other than those listed in paragraph A above shall be recognized nor observed.

SECTION 5 - REPORTING PAY

- A. Employees who report to the work location pursuant to regular schedule and who are not provided with work or whose work is terminated early by a Contractor, for whatever reason, shall receive minimum reporting pay in accordance with the applicable Local Unions' collective bargaining agreements.
- B. When an employee, who has completed his/her scheduled shift and left the Project site, is "called out" to perform special work of a casual, incidental or irregular nature, the employee shall receive

pay for actual hours worked with a minimum guarantee, as may be required by the applicable Local Union's collective bargaining agreement, at the employee's straight time rate.

- C. When an employee leaves the job or work location of his/her own volition or is discharged for cause or is not working as a result of the Contractor's invocation of Section 7 below, he/she 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 payment 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 Local Union's collective bargaining agreement requires a full week's pay for forepersons.

SECTION 6 - PAYMENT OF WAGES

- A. Payday - Payment shall be made by check, drawn on a New York bank with branches located within commuting distance of the job site. Paychecks shall be issued by a Contractor at the job site by 10 a.m. on Thursdays. In the event that the following Friday is a bank holiday, paychecks shall be issued on Wednesday of that week. Not more than 3 days wages shall be held back in any pay period. Paycheck stubs shall contain the name and business address of the Contractor, together with an itemization of deductions from gross wages.
- B. Termination - Employees who are laid off or discharged for cause shall be paid in full for that which is due them at the time of termination. The Contractor shall also provide the employee with a written statement setting forth the date of lay off or discharge.

SECTION 7 - 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 On-Site Project Work. In such instances, employees will be paid for actual time worked; provided, however, that when a Contractor requests that employees remain at the job site available for work, employees will be paid for "stand by" time at their hourly rate of pay.

SECTION 8 - INJURY-DISABILITY

An employee who, after commencing work, suffers a work-related injury or disability while performing work duties, shall receive no less than 8 hours wages for that day. Further, the employee shall be rehired

at such time as able to return to duties provided there is still work available on the Project for which the employee is qualified and able to perform.

SECTION 9 - TIME KEEPING

A Contractor may utilize brassing or other systems to check employees in and out. Each employee must check in and out. The Contractor will provide adequate facilities for checking in and out in an expeditious manner.

SECTION 10 - 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 trades. If an employee is required to work through the meal period, the employee shall be compensated in a manner established in the applicable Local Union's collective bargaining agreement.

SECTION 11 - BREAK PERIODS

There will be no rest periods, organized coffee breaks or other non-working time established during working hours. Individual coffee containers will be permitted at the employee's work location.

ARTICLE 13 - APPRENTICES

SECTION 1 - RATIOS

Recognizing the need to maintain continuing supportive programs designed to develop adequate numbers of competent workers in the construction industry and to provide trade entry opportunities for minorities and women, Contractors will employ apprentices in their respective trades to perform such work as is within their capabilities and which is customarily performed by the trade in which they are indentured. Contractors may utilize apprentices and such other appropriate classifications as are contained in the applicable Local Union's collective bargaining agreement in a ratio not to exceed 25% of the work force by trade (without regard to whether a lesser ratio is set forth in the applicable Local Union's collective bargaining agreement), unless the applicable Local Union's collective bargaining agreement provides for a higher percentage. Apprentices and such other classifications as are appropriate shall be employed in a manner consistent with the provisions of the appropriate Local Union's collective bargaining agreement.

SECTION 2 - DEPARTMENT OF LABOR

To assist the Contractors in attaining a maximum effort on this Project, the Local Unions agree to work in close cooperation with, and accept monitoring by, the New York State Department of Labor and the County to ensure that minorities and women are afforded every opportunity to participate in apprenticeship programs which result in the placement of apprentices on this Project. To further ensure that this contractor effort is attained, up to 50% of the apprentices placed on this Project shall be first year minority or women apprentices as shall be 60% of the apprentice equivalents, placed on the Project, who do not necessarily meet all of the age or entrance requirements for the apprentice program or have not necessarily passed the entrance examination. The Local Unions will cooperate with the contractor requests for minority, women or economically disadvantaged referrals to meet this contractor effort.

ARTICLE 14 - SAFETY PROTECTION OF PERSON AND PROPERTY

SECTION 1 - SAFETY REQUIREMENTS

Each Contractor will ensure that applicable OSHA requirements are at all times maintained on the Project and the employees and the Local Unions agree to cooperate fully with these efforts. Employees must perform their work at all times in a safe manner and protect themselves and the property of the Contractors and the County from injury or harm. Failure to do so will be grounds for discipline, including discharge.

SECTION 2 - CONTRACTOR RULES

Employees covered by this Agreement shall at all times be bound by the reasonable safety, security, and visitor rules as established by the Contractors for this Project. Such rules will be published and posted in conspicuous places throughout the Project.

SECTION 3 - INSPECTIONS

The Contractors retain the right to inspect incoming shipments of equipment, apparatus, machinery and construction materials of every kind.

ARTICLE 15 - NO DISCRIMINATION

SECTION 1 - COOPERATIVE EFFORTS

The Contractors and the Local Unions agree that they will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, national origin, age or

marital status in any manner prohibited by law or regulation. It is recognized that special procedures may be established by the Contractors, the Local Unions and the New York State Department of Labor for the training and employment of persons who have not previously qualified to be employed on construction projects of the type covered by this Agreement. The parties to this Agreement will assist in such programs and agree to use their best efforts to ensure that the goals for female and minority employment are met on this Project.

SECTION 2 - LANGUAGE OF AGREEMENT

The use of the masculine or feminine gender in this Agreement shall be construed as including both genders.

ARTICLE 16 - GENERAL TERMS

SECTION 1 - PROJECT RULES

The Contractors shall establish such reasonable Project rules as are appropriate for the good order of the Project. These rules will be explained at the pre-job conference and posted at the Project site and may be amended thereafter as necessary. 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.

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 jurisdictions.

SECTION 3 - SUPERVISION

Employees shall work under the supervision of the trade foreperson or general foreperson.

SECTION 4 - TRAVEL ALLOWANCES

There shall be no payments for travel expenses, travel time, subsistence allowance or other such reimbursements or special pay except as expressly set forth in this Agreement.

SECTION 5 - FULL WORK DAY

Employees shall be at their staging area at the starting time established by the Contractor and shall be returned to their staging area by quitting time after performing their assigned functions under the supervision of the Contractor. The signatories reaffirm their policy of a fair day's work for a fair day's wage.

SECTION 6 - COOPERATION

The Contractor and the Local Unions will cooperate in seeking any New York State Department of Labor approvals that may be required for implementation of any terms of this Agreement.

ARTICLE 17 - 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 otherwise found in violation of law, the provision involved shall be rendered, temporarily or permanently, null and void but the remainder of the Agreement shall remain in full force and effect. In such event, the Agreement shall remain in effect for contracts already bid and awarded or in construction where the Contractor voluntarily accepts the Agreement. The parties to this Agreement will enter into negotiations for a substitute provision in conformity with the law and the intent of the parties for contracts to be let in the future.

SECTION 2 - THE BID SPECIFICATIONS

In the event that the County bid specifications, or other action, requiring that a successful bidder become signatory to this Agreement is enjoined, on either an interlocutory or permanent basis, or otherwise found in violation of law such requirement shall be rendered, temporarily or permanently, null and void but the Agreement shall remain in full force and effect to the extent allowed by law. In such event, the Agreement shall remain in effect for contracts already bid and awarded or in construction where the Contractor voluntarily accepts the Agreement. The parties will enter into negotiations as to modifications to the Agreement to reflect the court 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 County, the Contractors, or any Local Union shall be liable, directly or indirectly, for any action taken, or not taken, to

comply with any court order, injunction or determination. Project 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 Contractors and Local Unions.

ARTICLE 18 - FUTURE CHANGES IN SCHEDULE "A" COLLECTIVE BARGAINING AGREEMENTS

SECTION 1 - CHANGES TO COLLECTIVE BARGAINING AGREEMENTS

- A. The Contractors and/or Local Unions who are parties to the collective bargaining agreements which are applicable to the On-Site Project Work shall notify the Contractor in writing of any mutually agreed upon changes in provisions of such agreements and the effective dates of such changes.
- B. It is agreed that any provisions negotiated into collective bargaining agreements will not apply to On-Site Project Work if such provisions are less favorable to this Project than those uniformly required of contractors for construction work normally covered by those agreements; nor shall any provision be recognized or applied on this Project 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 application to On-Site Project Work of provisions agreed upon in the renegotiation of collective bargaining agreements shall be resolved in accordance with the procedure set forth in Article 9 of this Agreement.

SECTION 2 - LABOR DISPUTES DURING COLLECTIVE BARGAINING AGREEMENT NEGOTIATIONS

The Local 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 Project by any Local Union involved in the renegotiation of collective bargaining agreements nor shall there be any lock-out on this Project affecting a Local Union during the course of such renegotiations.

ARTICLE 19 – WORKERS’ COMPENSATION ADR

All Local Unions, the Contractor and its subcontractors performing On-Site Project Work agree to adopt and be bound by the Alternative Dispute Resolution Agreement entered into between the Construction Industry Council of Westchester and Hudson Valley, Inc. and the Council (herein after referred to as the “Workers’ Compensation ADR Agreement”).

The Contractor and its subcontractors may provide Workers’ Compensation insurance through an alternative insurance carrier (or through self-insurance) or may use an alternative Program Manager, other than the primary carrier or Program Manager designated in Article III, Section 2 of the Workers’ Compensation ADR Agreement. The use of an alternative carrier (or self-insurance) and/or Program Manager is subject to approval by the Workers’ Compensation ADR Agreement Oversight Committee, which approval shall not be unreasonably withheld.

The determination to utilize the Workers’ Compensation ADR Agreement will be at the exclusive option of the County.

SIGNATURES

IN WITNESS WHEREOF the parties have caused this Agreement to be executed and effective as the ____ day of _____, 20__.

**BUILDING AND CONSTRUCTION TRADES COUNCIL OF
WESTCHESTER AND PUTNAM COUNTIES, NEW YORK, AFL-CIO
on behalf of itself and its affiliated Local Unions.**

BY: _____
PRESIDENT

DATE: _____

BY: _____
VICE-PRESIDENT

DATE _____

BY: _____
SECRETARY-TREASURER

DATE _____

{INSERT NAME OF CONTRACTOR}

BY: _____
(Name & Title)

DATE _____

**APPROVED BY:
COUNTY OF WESTCHESTER**

BY: _____
Commissioner of Public Works and Transportation

DATE: _____

Approved as to form:

Sr. Assistant County Attorney
County of Westchester

SCHEDULE “A”

LOCAL COLLECTIVE BARGAINING AGREEMENTS

Below is a list of the affiliate Local Unions of the Building and Construction Trades Council of Westchester and Putnam Counties, New York, AFL-CIO (“Council”). Copies of the applicable Collective Bargaining Agreements of the Local Unions can be obtained by writing to the Building and Construction Trades Council Westchester and Putnam Counties, New York AFL-CIO at 258 Saw Mill River Road, Elmsford, New York 10523, Attn: Edward Doyle, President.

1. Asbestos Workers Local #91 (International Association of Heat and Frost Insulators and Asbestos Workers).
2. Boilermakers Local #5
3. Bricklayers and Allied Craftworkers Local #5 New York
4. Bridge Painters Local 806
5. Dockbuilders Local Union 1456
6. Empire State Regional Council of Carpenters, Reg. 2, Local 11
7. Glaziers Local 1281
8. International Association of Bridge and Structural Ironworkers Local Union 40
9. International Brotherhood of Electrical Workers Local Union 363
10. International Brotherhood of Painters & Allied Trades District Council 9 of New York
11. International Union of Operating Engineers Local 15, 15A, 15B, 15C and 15D
12. International Union of Operating Engineers Local Unions No. 137, 137A, 137B, 137C, 137R
13. Iron Workers District Council of Greater New York and Vicinity
14. IUOE Local No. 30 – Operating Engineers
15. Laborers’ International Union of N.A. Local 235 of Westchester and Putnam Counties, New York AFL-CIO
16. Local One International Union of Elevator Constructors of New York and New Jersey – (AFL-CIO)
17. Local Union #3 International Brotherhood of Electrical Workers
18. Metal Polishers Local 8A-28A
19. Metallic Lathers Local No. 46
20. Millwright and Machinery Erectors Local Union No. 740
21. Operative Plasterers’ and Cement Masons’ International Association Local 530
22. Ornamental Ironworkers Local Union No. 580
23. Plumbers and Steamfitters Local 21
24. Resilient Floor Coverers Local No. 2287

25. Road Sprinkler Fitters Local 669
26. Sheet Metal Workers' International Association Local 137
27. Sheet Metal Workers' Local Union 38
28. Stone Derrickmen and Riggers Local Union No. 197
29. Teamsters Local 813 (Waste Removal)
30. Teamsters Local No. 814 (Moving & Storage)
31. Teamsters Local Union No. 456 (Construction)
32. Tile, Marble & Terrazzo Bricklayers & Allied Craftsmen Local Union No. 7 of New York & New Jersey
33. United Cement Masons' Union of Greater New York and Long Island Local 780
34. United Union of Roofers, Waterproofers and Allied Workers, Local No. 8, New York
35. Westchester Putnam Counties Heavy and Highway Laborers' Local No. 60 L.I.U.N.A.

Not all Local Unions will necessarily be involved in the Project. If it is determined that additional affiliates of the Council are required to be engaged in Project construction work, then the PLA will include those additional affiliates.



SCHEDULE OF HOURLY RATES
AND SUPPLEMENTS

DEPARTMENT OF PUBLIC WORKS

Division of Engineering



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Westchester County DPWT

Yolanda Spraggins, Secretary II
148 Martine Ave. RM. 518
White Plains NY 10601

Schedule Year 2023 through 2024
Date Requested 01/31/2024
PRC# 2024001220

Location Bronx Valley Sanitary Sewer
Project ID# 22-510
Project Type Misc. demo., install new electrical and instrumentation equip., new heat/ventilation, Maj. mech. equip. replacement. Flood Mitigation, install new elevated electrical emergency generator

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2023 through June 2024. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission; a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract **MUST** obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule **MUST** be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion [online](#).

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule from the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12226; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is **REQUIRED** to provide complete copies to all prime contractors who in turn **MUST**, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor **MUST** keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment. Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed \$100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds \$25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "[Public Work Project](#)" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers. compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers. Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12226 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex 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 (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of \$50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Westchester County DPWT

Yolanda Spraggins, Secretary II
148 Martine Ave. RM. 518
White Plains NY 10601

Schedule Year 2023 through 2024
Date Requested 01/31/2024
PRC# 2024001220

Location Bronx Valley Sanitary Sewer
Project ID# 22-510
Project Type Misc. demo., install new electrical and instrumentation equip., new heat/ventilation, Maj. mech. equip. replacement. Flood Mitigation, install new elevated electrical emergency generator

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information

All information must be supplied

Federal Employer Identification Number: _____		
Name: _____		
Address: _____ _____		
City: _____	State: _____	Zip: _____
Amount of Contract: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	<input type="checkbox"/> (01) General Construction	
Approximate Completion Date: ____/____/____	<input type="checkbox"/> (02) Heating/Ventilation	
	<input type="checkbox"/> (03) Electrical	
	<input type="checkbox"/> (04) Plumbing	
	<input type="checkbox"/> (05) Other : _____	

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12226

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to \$1,500 for a first offense and up to \$5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, <https://dol.ny.gov/public-work-and-prevailing-wage>

If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website www.labor.ny.gov or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

**To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND**

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12226

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.



Required Notice under Article 25-B of the Labor Law

**Attention All Employees, Contractors and Subcontractors:
You are Covered by the Construction Industry Fair Play Act**

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor, **you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

- **Civil Penalty**
 - First offense: Up to \$2,500 per employee
 - Subsequent offense(s): Up to \$5,000 per employee
- **Criminal Penalty**
 - First offense: Misdemeanor - up to 30 days in jail, up to a \$25,000 fine and debarment from performing public work for up to one year.
 - Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a \$50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

IA 999 (09/16)



Attention Employees

THIS IS A: **PUBLIC WORK PROJECT**

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Your pay stub and wage notice received upon hire must clearly state your wage rate and supplement rate.

Chapter 629 of
the Labor Laws
of 2007:

These wages are set by law and must be posted at the work site. They can also be found at:
<https://dol.ny.gov/bureau-public-work>



If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5287		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is \$250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training "prior to the performing any work on the project."

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.*)
- Training roster, attendance record or other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is \$3 million in Bronx, Kings, New York, Queens and, Richmond counties; \$1.5 million in Nassau, Suffolk and Westchester counties; and \$500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirements on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.

Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.

Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.

Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12226

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Westchester County General Construction

Boilermaker

02/01/2024

JOB DESCRIPTION Boilermaker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour: 07/01/2023 01/01/2024

Boilermaker	\$ 65.88	\$ 67.38
Repairs & Renovations	65.88	67.38

Repairs & Renovation: Includes Repairing, Renovating replacement of parts to an existing unit(s).

SUPPLEMENTAL BENEFITS

Per Hour:

Boilermaker	33.5% of hourly	33.5% of Hourly
Repair \$ Renovations	Wage Paid	Wage Paid
	+ \$ 26.49	+ \$26.85

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay.

Repairs & Renovation Includes replacement of parts and repairs & renovation of existing unit.

OVERTIME PAY

See (*B, O, **U) on OVERTIME PAGE

Note:* Includes 9th & 10th hours, double for 11th or more.

** Labor Day ONLY, if worked.

Repairs & Renovation see (B,E,Q) on OT Page

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 12, 15, 25, 26, 29) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

(1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

Apprentice(s)	33.5% of Hourly Wage Paid Plus Amount Below	33.5% of Hourly Wage Paid Plus Amount Below
1st Term	\$ 20.12	\$ 20.36
2nd Term	21.03	21.28
3rd Term	21.95	22.22
4th Term	22.83	23.12
5th Term	23.76	24.07
6th Term	24.67	25.00
7th Term	25.58	25.93

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Carpenter

02/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Piledriver \$ 59.16
+ 9.79*

Dockbuilder \$ 59.16
+ 9.79*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 45.34

OVERTIME PAY

See (B, E2, O) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour

(1)year terms:

1st	2nd	3rd	4th
\$25.60	\$31.20	\$39.58	\$47.97
+ 5.30*	+ 5.30*	+ 5.30*	+ 5.30*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

All Terms: \$ 31.83

8-1556 Db

Carpenter

02/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Carpet/Resilient

Floor Coverer \$ 55.05
+ 8.25*

*This portion is not subject to overtime premiums

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 39.45

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wage per hour - (1) year terms:

1st	2nd	3rd	4th
\$ 25.20	\$ 28.20	\$ 32.45	\$ 40.33

+ 1.85* + 2.35* + 2.85* + 3.85*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 15.22	\$ 16.22	\$ 19.32	\$ 20.32

8-2287

Carpenter**02/01/2024**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2023

Marine Construction:

Marine Diver \$ 74.03
 + 9.79*

Marine Tender \$ 53.57
 + 9.79*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 45.34

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 13, 16, 18, 19, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms.

1st year	\$ 25.60 + 5.30*
2nd year	31.20 + 5.30*
3rd year	39.58 + 5.30*
4th year	47.97 + 5.05*

*This portion is not subject to overtime premiums

Supplemental Benefits

Per Hour:

All terms \$ 31.83

8-1456MC

Carpenter**02/01/2024**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Building
Millwright \$ 58.70
 + 12.62*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Millwright \$ 44.31

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18,19) on HOLIDAY PAGE.

Overtime See (5,6,8,11,13,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$31.74	\$37.19	\$42.64	\$53.54
+ 6.75*	+ 7.92*	+ 9.09*	+ 11.43*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$29.81	\$32.34	\$35.52	\$39.94

8-740.1

Carpenter

02/01/2024

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:

07/01/2023

Timberman \$ 54.05
 + 10.26*

*This portion not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2023

\$ 44.55

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms:

1st	2nd	3rd	4th
\$23.42	\$28.53	\$36.18	\$43.84
+ 5.55*	+ 5.55*	+ 5.55*	+ 5.55*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:
All terms \$ 31.54

8-1556 Tm

Carpenter	02/01/2024
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JOB DESCRIPTION Carpenter **DISTRICT 8**

ENTIRE COUNTIES
Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Westchester

PARTIAL COUNTIES
Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.
Putnam: South of but including the following, Cold Spring, Tompkins Corner, Mahopac, Croton Falls, east to Connecticut border.
Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

WAGES
Per hour: 07/01/2023

Core Drilling:
Driller \$ 43.88
+ 2.50*

Driller Helper \$ 34.47
+ 2.50*

Note: Hazardous Waste Pay Differential:
For Level C, an additional 15% above wage rate per hour
For Level B, an additional 15% above wage rate per hour
For Level A, an additional 15% above wage rate per hour
Note: When required to work on water: an additional \$ 3.00 per hour.

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS
Per hour:

Driller and Helper \$ 28.85

OVERTIME PAY
See (B, G, P) on OVERTIME PAGE

HOLIDAY
Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

8-1536-CoreDriller

Carpenter - Building / Heavy&Highway	02/01/2024
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JOB DESCRIPTION Carpenter - Building / Heavy&Highway **DISTRICT 11**

ENTIRE COUNTIES
Putnam, Rockland, Westchester

WAGES
WAGES:(per hour)
Applies to CAPRENTER BUILDING/HEAVY & HIGHWAY/TUNNEL:

	07/01/2023	07/01/2024 Additional	07/01/2025 Additional	07/01/2026 Additional
Base Wage	\$ 39.80 +\$6.71*	\$ 1.25**	\$ 1.25**	\$ 1.25**

*For all hours paid straight or premium.
**To be allocated at a later date.

SHIFT DIFFERENTIAL: When it is mandated by a Government Agency irregular or off shift can be worked. The Carpenter shall receive an additional fifteen percent (15%) of wage plus applicable benefits.

SUPPLEMENTAL BENEFITS
Per hour:

Journeyworker \$ 33.22

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

BUILDING:

Paid: See (1) on HOLIDAY PAGE.

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE.

- Holidays that fall on Sunday will be observed Monday.

HEAVY&HIGHWAY/TUNNEL:

Paid: See (5, 6, 25) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

- Holidays that fall on Sunday will be observed Monday

- Must be employed during the five (5) work days immediately preceding a holiday or during the five (5) work days following the paid holiday to receive holiday pay

- If Employee is entitled to a paid holiday, the Employee is paid the Holiday wage and supplemental benefits whether they work or not. If Employee works the Holiday, the Employee will receive holiday pay (including supplemental benefits), plus the applicable premium wage for working the Holiday. If Employee works in excess of 8 hours on Holiday, then benefits will be paid for any hours in excess of 8 hours.

REGISTERED APPRENTICES

1 year terms at the following wage rates:

1st	2nd	3rd	4th	5th
\$ 19.90	\$ 23.88	\$ 25.87	\$ 27.86	\$ 31.84
+3.58*	+3.58*	+3.58*	+3.58*	+3.58*

*For all hours paid straight or premium

SUPPLEMENTAL BENEFITS per hour:

All terms \$ 16.27

11-279.1B/HH

Electrician

02/01/2024

JOB DESCRIPTION Electrician

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond, Westchester

WAGES

Per hour: 07/01/2023 03/07/2024

Service Technician \$ 36.40 \$ 37.40

Service and Maintenance on Alarm and Security Systems.

Maintenance, repair and /or replacement of defective (or damaged) equipment on, but not limited to, Burglar - Fire - Security - CCTV - Card Access - Life Safety Systems and associated devices. (Whether by service contract of T&M by customer request.)

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker: \$ 21.07 \$ 21.85

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE

9-3H

Electrician

02/01/2024

JOB DESCRIPTION Electrician

DISTRICT 8

ENTIRE COUNTIES

Westchester

WAGES

Per hour: 07/01/2023 04/18/2024 04/17/2025

*Electrician/A-Technician \$ 55.75 \$ 56.75 \$ 58.75

Teledata	55.75	56.75	58.75
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*All new installations of wiring, conduit, junction boxes and light fixtures for projects with a base bid of more than \$325,000. For projects with a base bid of \$325,000 or less, see Maintenance and Repair rates.

Note: On a job where employees are required to work on bridges over navigable waters, transmission towers, light poles, bosun chairs, swinging scaffolds, etc. 40 feet or more above the water or ground or under compressed air, or tunnel projects under construction or where assisted breathing apparatus is required, they will be paid at the rate of time and one-half for such work except on normal pole line or building construction work.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	\$ 56.26	\$59.39	\$61.09
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OVERTIME PAY

See (A, G, *J, P) on OVERTIME PAGE

*NOTE: Emergency work on Sunday and Holidays is at the time and one-half overtime rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following wage rates:

	07/01/2023	04/18/2024	04/17/2025
1st term	\$ 16.00	\$16.00	\$16.00
2nd term	17.00	17.00	17.00
3rd term	19.00	19.00	19.00
4th term	21.00	21.00	21.00
MIJ 1-12 months	26.50	26.50	26.50
MIJ 13-18 months	30.00	30.00	30.00

Supplemental Benefits per hour:

	07/01/2023	04/18/2024	04/17/2025
1st term	\$ 11.63	\$ 12.40	\$ 12.72
2nd term	14.30	15.07	15.89
3rd term	15.62	16.40	17.23
4th term	16.95	17.73	18.57
MIJ 1-12 months	13.92	15.72	15.89
MIJ 13-18 months	14.33	16.17	16.29

8-3/W

Electrician

02/01/2024

JOB DESCRIPTION Electrician

DISTRICT 8

ENTIRE COUNTIES

Westchester

WAGES

Per hour

	07/01/2023	04/18/2024	04/17/2025
Electrician -M	\$ 30.00	\$ 30.00	\$ 30.00
H - Telephone	30.00	30.00	30.00

All work with a base bid amount of \$325,000 or less. Including repairs and /or replacement of defective electrical and teledata equipment, all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls, and washing and cleaning of foregoing fixtures.

*If the project exceeds \$375,000 due to changes in the scope of work, an Electrician/A Technician must be part of the labor ratio.

SUPPLEMENTAL BENEFITS

	07/01/2023	04/18/2024	04/17/2025
Electrician &			
H - Telephone	\$ 14.33	\$ 16.17	\$ 16.29

OVERTIME PAY

See (B, G, *J, P) on OVERTIME PAGE

*Note: Emergency work on Sunday and Holidays is at the time and one-half overtime rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

Elevator Constructor

02/01/2024

JOB DESCRIPTION Elevator Constructor

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

PARTIAL COUNTIES

Rockland: Entire County except for the Township of Stony Point

Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per hour:

07/01/2023

Elevator Constructor \$ 77.49

Modernization &
Service/Repair \$ 60.89

NOTE - The 'Employer Registration' (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per Hour:

Elevator Constructor \$ 45.574

Modernization &
Service/Repairs 44.412

OVERTIME PAY

Constructor See (D, M, T) on OVERTIME PAGE.

Modern/Service See (B, F, S) on OVERTIME PAGE.

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

*Note: 1st, 2nd, 3rd Terms are based on Average wage of Constructor & Modernization.

Terms 4 thru 9 Based on Journeyman's wage of classification Working in.

6 MONTH TERMS:

1st Term*	2nd & 3rd Term*	4th & 5th Term	6th & 7th Term	8th & 9th Term
50%	50%	55%	65%	75%

SUPPLEMENTAL BENEFITS

Elevator Constructor

1st Term	\$ 0.00
2nd & 3rd Term	36.024
4th & 5th Term	36.943
6th & 7th Term	38.448
8th & 9th Term	39.953

Modernization &
Service/Repair

1st Term	\$ 0.00
2nd & 3rd Term	35.694
4th & 5th Term	36.525
6th & 7th Term	37.948
8th & 9th Term	39.38

Elevator Constructor**02/01/2024****JOB DESCRIPTION** Elevator Constructor**DISTRICT 1****ENTIRE COUNTIES**

Columbia, Dutchess, Greene, Orange, Putnam, Sullivan, Ulster

PARTIAL COUNTIES

Delaware: Towns of Andes, Bovina, Colchester, Davenport, Delhi, Harpersfield, Hemdon, Kortright, Meredith, Middletown, Roxbury, Hancock & Stamford

Rockland: Only the Township of Stony Point.

Westchester: Only the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per Hour	07/01/2023	01/01/2024
Mechanic	\$ 67.35	\$ 70.15
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour	07/01/2023	01/01/2024
Journeyman/Helper	\$ 37.335*	\$ 37.885*

(*)Plus 6% of regular hourly if less than 5 years of service. Plus 8% of regular hourly rate if more than 5 years of service.

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 15, 16) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 16) on HOLIDAY PAGE

Note: When a paid holiday falls on Saturday, it shall be observed on Friday. When a paid holiday falls on Sunday, it shall be observed on Monday.

REGISTERED APPRENTICES

Wages per hour:

0-6 mo*	6-12 mo	2nd yr	3rd yr	4th yr
50 %	55 %	65 %	70 %	80 %

(*)Plus 6% of the hourly rate, no additional supplemental benefits.

Supplemental Benefits per hour worked:

Same as Journeyman/Helper

1-138

Glazier**02/01/2024****JOB DESCRIPTION** Glazier**DISTRICT 8****ENTIRE COUNTIES**

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per hour:	7/01/2023
Glazier & Glass Tinting	\$ 61.64
*Scaffolding	65.64
Window Film	
**Repair & Maintenance	30.76

*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 30' or more, but not pipe scaffolding.

****Repair & Maintenance-** All repair & maintenance work on a particular building whenever performed, where the total cumulative Repair & Maintenance contract value is under \$184,000.

SUPPLEMENTAL BENEFITS

Per hour: 7/01/2023

Glazier & Glass Tinting \$ 40.20

Window Film
Repair & Maintenance 23.19

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

For 'Repair & Maintenance' see (B, B2, I, S) on overtime page.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE

For 'Repair & Maintenance'

Paid: See(5, 6, 16, 25)

Overtime: See(5, 6, 16, 25)

REGISTERED APPRENTICES

Wage per hour:

(1) year terms at the following wage rates:

7/01/2023

1st term \$ 21.93
2nd term 30.05
3rd term 39.95
4th term 48.97

Supplemental Benefits:

(Per hour)

1st term \$ 18.25
2nd term 25.97
3rd term 31.27
4th term 34.32

8-1087 (DC9 NYC)

Insulator - Heat & Frost

02/01/2024

JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Westchester

WAGES

Per hour: 07/01/2023 06/01/2024

Insulator \$ 59.25 + \$ 2.50

Discomfort & 62.31 + \$ 2.50
Additional Training**

Fire Stop Work* 31.77 + \$ 2.50

* Applies on all exclusive Fire Stop Work (When contract is for Fire Stop work only). No apprentices on these contracts only.

**Applies to work requiring: garb or equipment worn against the body not customarily worn by insulators; psychological evaluation ;special training, including but not limited to "Yellow Badge" radiation training

Note: Additional \$0.50 per hour for work 30 feet or more above floor or ground level.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 37.35

Discomfort & Additional Training	39.39
Fire Stop Work:	
Journeyworker	19.03

OVERTIME PAY

See (B, E, E2, Q, *T) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Note: Last working day preceding Christmas and New Years day, workers shall work no later than 12:00 noon and shall receive 8 hrs pay.

Overtime: See (2*, 4, 6, 16, 25) on HOLIDAY PAGE.

*Note: Labor Day triple time if worked.

REGISTERED APPRENTICES

(1) year terms:

Insulator Apprentices:

1st	2nd	3rd	4th
\$ 31.77	\$ 37.26	\$ 42.76	\$ 48.26

Discomfort & Additional Training Apprentices:

1st	2nd	3rd	4th
\$ 33.30	\$ 39.09	\$ 44.90	\$ 50.71

Supplemental Benefits paid per hour:

Insulator Apprentices:

1st term	\$ 19.03
2nd term	22.69
3rd term	26.36
4th term	30.03

Discomfort & Additional Training Apprentices:

1st term	\$ 20.06
2nd term	23.92
3rd term	27.78
4th term	31.66

8-91

Ironworker

02/01/2024

JOB DESCRIPTION Ironworker

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:	07/01/2023	01/01/2024
Stone Derrickmen Rigger	\$ 72.90	Additional + \$ 1.64
Stone Handset Derrickman	70.47	+ \$ 1.11

SUPPLEMENTAL BENEFITS

Per hour:

Stone Derrickmen Rigger	\$ 43.10
Stone Handset Derrickman	42.84

OVERTIME PAY

See (B, D1, *E, Q, **V) on OVERTIME PAGE

*Time and one-half shall be paid for all work on Saturday up to eight (8) hours and double time shall be paid for all work thereafter.

** Benefits same premium as wages on Holidays only

HOLIDAY

Paid: See (18) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 25) on HOLIDAY PAGE

Work stops at schedule lunch break with full day's pay.

REGISTERED APPRENTICES

Wage per hour:

Stone Derrickmen Rigger:

	1st	2nd	3rd	4th
07/01/2023	\$ 35.90	\$ 51.53	\$ 57.32	\$ 63.11

Supplemental Benefits:

Per hour:

07/01/2023	22.11	32.58	32.58	32.58
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Stone Handset:

1/2 year terms at the following hourly wage rate:

	1st	2nd	3rd	4th
07/01/2023	34.56	49.75	55.33	60.90

Supplemental Benefits:

Per hour:

07/01/2023	22.10	32.46	32.46	32.46
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9-197D/R

Ironworker

02/01/2024

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour: 07/01/2023

Ornamental	\$ 46.90
Chain Link Fence	46.90
Guide Rail	46.90

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker: \$ 63.04

OVERTIME PAY

See (B, B1, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Apprentices Hired after 9/1/18:

1 year terms

	07/01/2023
1st Term	\$ 21.13
2nd Term	24.77
3rd Term	28.40
4th Term	32.06

Supplemental Benefits per hour:

1st Term	\$ 17.90
2nd Term	19.15
3rd Term	20.41
4th Term	21.67

4-580-Or

Ironworker

02/01/2024

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

PER HOUR:

07/01/2023	01/01/2024	07/01/2024
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Ironworker:			Additional
Structural	\$ 57.20	\$ 57.70	\$ 1.75/Hr.*
Bridges			
Machinery			

(*)To be allocated at a later date.

SUPPLEMENTAL BENEFITS

PER HOUR PAID:

Journeyman	\$ 87.35	\$ 88.60
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OVERTIME PAY

See (B, B1, Q, *V) on OVERTIME PAGE

*NOTE: Benefits are calculated for every hour paid

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

6 month terms at the following rate:

1st	\$ 29.73	\$ 29.98
2nd	30.33	30.58
3rd - 6th	30.94	31.19

Supplemental Benefits

PER HOUR PAID:

All Terms	\$ 60.69	\$ 61.59
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4-40/361-Str

Ironworker

02/01/2024

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES

Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

WAGES

Per hour: 07/01/2023

Reinforcing &
Metal Lathing \$ 56.95

"Base" Wage \$ 55.20
plus \$ 1.75

"Base" Wage is used to calculate overtime hours only.

SUPPLEMENTAL BENEFITS

Per hour:

Reinforcing & Metal Lathing \$ 42.72

OVERTIME PAY

See (B, E, Q, *X) on OVERTIME PAGE

*Only \$23.50 per Hour for non worked hours

Supplemental Benefit Premiums for Overtime Hours worked:

Time & One Half \$ 49.47
Double Time \$ 56.22

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 13, *18, **19, 25) on HOLIDAY PAGE

*Note: Work performed after first 4 Hours.

REGISTERED APPRENTICES

(1) year terms at the following wage rates:

1st term	2nd term	3rd term	4th Term
Wage Per Hour: \$ 22.55	\$ 28.38	\$ 34.68	\$ 37.18
"Base" Wage \$ 21.00 plus \$1.55	\$ 26.80 plus \$1.58	\$ 33.10 plus \$1.58	\$ 35.60 plus \$1.58

"Base" Wage is used to calculate overtime hours ONLY.

SUPPLEMENTAL BENIFITS
Per Hour:

1st term	2nd term	3rd term	4th Term
\$ 18.17	\$ 21.34	\$ 22.00	\$ 22.50

4-46Reinf

Laborer - Building

02/01/2024

JOB DESCRIPTION Laborer - Building

DISTRICT 8

ENTIRE COUNTIES
Putnam, Westchester

WAGES

Per hour	07/01/2023	05/01/2024
Laborer	\$ 40.05 plus \$5.45**	+ \$ 2.00
Laborer - Asbestos & Hazardous Materials Removal	\$ 44.50*	+ \$ 2.00

* Abatement/Removal of:

- Lead based or lead containing paint on materials to be repainted is classified as Painter.
- Asbestos containing roofs and roofing material is classified as Roofer.

** This portion is not subject to overtime premium.

NOTE: Upgrade/Material condition work plan for work performed during non-outage under a wage formula of 90% wage/100% fringe benefits at nuclear power plants.

SUPPLEMENTAL BENEFITS

Per hour:	07/01/2023
Journeyworker	\$ 30.50

OVERTIME PAY

See (B, E, E2, Q, *V) on OVERTIME PAGE

*Note: For Sundays and Holidays worked benefits are at the same premium as wages.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

LABORER ONLY

Hourly terms at the following wage:

Level A 0-1000 \$ 28.08	Level B 1001-2000 \$ 31.90	Level C 2001-3000 \$ 35.72	Level D 3001-4000 \$ 39.54
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Supplemental Benefits per hour:

Apprentices All terms	\$ 23.20
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8-235/B

Laborer - Heavy&Highway

02/01/2024

JOB DESCRIPTION Laborer - Heavy&Highway

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

****PUTNAM: APPLIES TO ALL HEAVY & HIGHWAY WORK EXCLUDING HIGHWAYS, STREETS, AND BRIDGES****

GROUP I: Blaster, Quarry Master, Curbs/Asphalt Screedman, Pipe Jacking and Boring Operations Operator, Qualified Dead Condition Pipe Fuser (B Mechanic)

GROUP II: Burner, Drillers(jumbo, joy, wagon, air track, hydraulic), Drill Operator, Self Contained Rotary Drill, Curbs, Raker, Bar Person, Concrete Finisher.

GROUP III: Pavement Breakers, Jeep Operator, Jack Hammer, Pneumatic Tools (all), Gas Driller, Guniting, Railroad Spike Puller, Pipelayer, Chain Saw, Deck winches on scows, Power Buggy Operator, Power Wheelbarrow Operator, Bar Person Helper, Compressed Air lance, Water Jet Lance.

GROUP IV: Concrete Laborers, Asph. Worker, Rock Scaler, Vibrator Oper., Bit Grinder, Air Tamper, Pumps, Epoxy (adhesives, fillers and troweled on), Barco Rammer, Concrete Grinder, Crack Router Operator, Guide Rail-digging holes and placing concrete and demolition when not to be replaced, distribution of materials and tightening of bolts.

GROUP V: Drillers Helpers, Common Laborer, Mason Tenders, Signal Person, Pit Person, Truck Spotter, Powder Person, Landscape/Nursery Person, Dump Person, Temp. Heat.

GROUP VIA: Asbestos/Toxic Waste Laborer-All removal (Roads, Tunnels, Landfills, etc.) Confined space laborer, Bio-remediation, Phyto-remediation, Lead or Hazardous material, Abatement Laborer.

Wages:(per hour) 07/01/2023

GROUP I	\$ 49.55*
GROUP II	48.20*
GROUP III	47.80*
GROUP IV	47.45*
GROUP V	47.10*
GROUP VIA	49.10*
Operator Qualified	
Gas Mechanic(A Mech)	59.55*
Flagperson	40.75*

*NOTE: To calculate overtime premiums, deduct \$0.10 from above wages

SHIFT WORK: A shift premium will be paid on Public Work contracts for off-shift or irregular shift work when mandated by the NYS D.O.T. or other Governmental Agency contracts. Employees shall receive an additional 15% per hour above current rate for all regular and irregular shift work. Premium pay shall be calculated using the 15% per hour differential as base rate.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:

First 40 Hours	
Per Hour	\$ 26.60
Over 40 Hours	
Per Hour	19.85

OVERTIME PAY

See (B, E, P, R, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

NOTE: For Holiday Overtime: 5, 6 - Code 'S' applies
For Holiday Overtime: 8, 15, 25, 26 - Code 'R' applies

REGISTERED APPRENTICES

	1st term	2nd term	3rd term	4th term
	1-1000hrs	1001-2000hrs	2001-3000hrs	3001-4000hrs
07/01/2023	\$ 27.46	\$ 32.41	\$ 37.12	\$ 41.83

Supplemental Benefits per hour:

1st term	\$ 3.85 - After 40 hours: \$ 3.60
2nd term	\$ 3.95 - After 40 hours: 3.60
3rd term	\$ 4.45 - After 40 hours: 4.00
4th term	\$ 5.00 - After 40 hours: 4.50

8-60H/H

Laborer - Tunnel

02/01/2024

JOB DESCRIPTION Laborer - Tunnel

DISTRICT 11

ENTIRE COUNTIES

Columbia, Dutchess, Greene, Orange, Otsego, Putnam, Rockland, Sullivan, Ulster, Westchester

PARTIAL COUNTIES

Chenango: Townships of Columbus, Sherburne and New Berlin.

Delaware: Townships of Andes, Bovina, Middletown, Roxbury, Franklin, Hamden, Stamford, Delhi, Kortright, Harpersfield, Merideth and Davenport.

WAGES

Class 1: All support laborers/sandhogs working above the shaft or tunnel.

Class 2: All laborers/sandhogs working in the shaft or tunnel.

Class 4: Safety Miners

Class 5: Site work related to Shaft/Tunnel

WAGES: (per hour)

	07/01/2023	06/01/2024	06/01/2025
Class 1	\$ 55.55	\$ 57.05	\$ 58.55
Class 2	57.70	59.20	60.70
Class 4	64.10	65.60	67.10
Class 5	47.65	49.90	51.40

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional \$ 3.00 an hour.

SHIFT DIFFERENTIAL...On all Government mandated irregular shift work:

- Employee shall be paid at time and one half the regular rate Monday through Friday.
- Saturday shall be paid at 1.65 times the regular rate.
- Sunday shall be paid at 2.15 times the regular rate.

SUPPLEMENTAL BENEFITS

Per hour:

Benefit 1	\$ 35.73	\$ 36.98	\$ 38.23
Benefit 2	51.01	TBD	TBD
Benefit 3	71.28	TBD	TBD

Benefit 1 applies to straight time hours, paid holidays not worked.

Benefit 2 applies to over 8 hours in a day (M-F), irregular shift work hours worked, and Saturday hours worked.

Benefit 3 applies to Sunday and Holiday hours worked.

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

When a recognized Holidays falls on Saturday or Sunday, holidays falling on Saturday shall be recognized or observed on Friday and holidays falling on Sunday shall be recognized or observed on Monday. Employees ordered to work on the Saturday or Sunday of the holiday or on the recognized or the observed Friday or Monday for those holidays falling on Saturday or Sunday shall receive double time the established rate and benefits for the holiday.

REGISTERED APPRENTICES

FOR APPRENTICE RATES, refer to the appropriate Laborer Heavy & Highway wage rate contained in the wage schedule for the County and location where the work is to be performed.

11-17/60/235/754Tun

Lineman Electrician

02/01/2024

JOB DESCRIPTION Lineman Electrician

DISTRICT 6

ENTIRE COUNTIES

Westchester

WAGES

A Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors, assembly of all electrical materials, conduit, pipe or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

A Groundman/Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator equipment/operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

Below rates apply to electrical overhead and underground distribution and maintenance work and overhead and underground transmission line work, electrical substations, switching structures, continuous pipe-type underground fluid or gas filled transmission conduit and cable installations, maintenance jobs or projects, railroad catenary installations and maintenance, third rail installations, the bonding of rails and the installation of fiber optic cable. (Ref #14.04.01)

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines. Also includes digging of holes for poles, anchors, footer, and foundations for electrical equipment.

Per hour:	07/01/2023	05/06/2024
Lineman, Tech, Welder	\$ 60.41	\$ 61.91
Crane, Crawler Backhoe	60.41	61.91
Cable Splicer-Pipe Type	66.45	68.10
Digging Mach Operator	54.37	55.72
Cert. Welder-Pipe Type	63.43	65.01
Tractor Trailer Driver	51.35	52.62
Groundman, Truck Driver	48.33	49.53
Equipment Mechanic	48.33	49.53
Flagman	36.25	37.15

Additional \$1.00 per hour for entire crew when a helicopter is used.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2023	05/06/2024
Lineman, Technician, or Equipment Operators with Crane License	\$ 29.40 *plus 7% of the hourly wage paid	\$ 30.90 *plus 7% of the hourly wage paid
All other Journeyman	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

OVERTIME PAY

See (B, E, Q,) on OVERTIME PAGE. *Note* Double time for emergency work designated by the Dept of Jurisdiction.
NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked.
Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.
Overtime See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS per hour:

07/01/2023	05/06/2024
\$ 26.40	\$ 26.90
*plus 7% of the hourly wage paid	*plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249aWest

Lineman Electrician - Teledata

02/01/2024

JOB DESCRIPTION Lineman Electrician - Teledata

DISTRICT 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour:

For outside work, stopping at first point of attachment (demarcation).

	07/01/2023	01/01/2024	01/01/2025
Cable Splicer	\$ 37.73	\$ 39.24	\$ 40.81
Installer, Repairman	\$ 35.81	\$ 37.24	\$ 38.73
Teledata Lineman	\$ 35.81	\$ 37.24	\$ 38.73
Tech., Equip. Operator	\$ 35.81	\$ 37.24	\$ 38.73
Groundman	\$ 18.98	\$ 19.74	\$ 20.53

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work please see LINEMAN.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS

Per hour:	07/01/2023	01/01/2024	01/01/2025
Journeyman	\$ 5.70	\$ 5.70	\$ 5.70
	*plus 3% of the hourly wage paid	*plus 3% of the hourly wage paid	*plus 3% of the hourly wage paid

*The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked.

Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting

02/01/2024

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting

DISTRICT 6

ENTIRE COUNTIES

Westchester

WAGES

Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

A Groundman/Groundman Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator/equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.

(Ref #14.01.03)

Per hour:	07/01/2023	05/06/2024
Lineman, Technician	\$ 54.73	\$ 55.95
Crane, Crawler Backhoe	54.73	55.95
Certified Welder	57.47	58.75
Digging Machine	49.26	50.36
Tractor Trailer Driver	46.52	47.56
Groundman, Truck Driver	43.78	44.76
Equipment Mechanic	43.78	44.76
Flagman	32.84	33.57

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30, 2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

	07/01/2023	05/06/2024
Lineman, Technician,	\$ 29.40	\$ 30.90

or Equipment Operators with Crane License	*plus 7% of the hourly wage paid	*plus 7% of the hourly wage paid
All other Journeyman	\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE. *Note* Double time for emergency work designated by the Dept. of Jurisdiction.

NOTE: WAGE CAP - Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 13, 25) on HOLIDAY PAGE and Governor of NYS Election Day.

Overtime: See (5, 6, 8, 13, 25) on HOLIDAY PAGE and Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES per hour: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

1st 60%	2nd 65%	3rd 70%	4th 75%	5th 80%	6th 85%	7th 90%
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SUPPLEMENTAL BENEFITS per hour:

07/01/2023	05/06/2024
\$ 26.40 *plus 7% of the hourly wage paid	\$ 26.90 *plus 7% of the hourly wage paid

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249aWestLT

Mason - Building

02/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2023	12/04/2023	06/05/2024 Additional \$ 0.72
Tile Setters	\$ 62.98	\$ 63.50	

SUPPLEMENTAL BENEFITS

Per Hour:	\$ 25.61*	\$25.81*
	+ \$10.04	+ \$10.04

* This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

Work beyond 10 hours on Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

(750 hour) term at the following wage rate:

Term:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6750	6501-7000
07/01/2023									
\$21.70	\$26.66	\$33.75	\$38.69	\$42.25	\$45.70	\$49.29	\$54.23	\$57.09	\$61.25
12/04/2023									
\$21.96	\$26.95	\$34.10	\$39.08	\$42.68	\$46.16	\$49.79	\$54.77	57.66	\$61.90

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
07/01/2023									
\$12.55*	\$12.55*	\$15.36*	\$15.36*	\$16.36*	\$17.86*	\$18.86*	\$18.86*	\$16.86*	\$22.11*
+\$0.73	+\$0.78	+\$0.88	+\$0.88	+\$1.37	+\$1.42	+\$1.83	+\$1.88	+\$6.03	+\$6.61
12/04/2023									
\$12.55*	\$12.55*	\$15.63*	\$15.36*	\$16.36*	\$17.86*	\$18.86*	\$18.86*	\$16.86*	\$22.11*
+\$0.73	+\$0.78	+\$0.89	+\$0.94	+\$1.38	+\$1.43	+\$1.84	+\$1.89	+\$6.04	+\$6.62

* This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/52A

Mason - Building	02/01/2024
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JOB DESCRIPTION Mason - Building

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:

07/01/2023

Bricklayer	\$ 45.89
Cement Mason	45.89
Plasterer/Stone Mason	45.89
Pointer/Caulker	45.89

Additional \$1.00 per hour for power saw work

Additional \$0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular workday is mandated or required by state, federal, county, local or other governmental agency contracts, the following premiums apply:

Irregular workday requires 15% premium

Second shift an additional 15% of wage plus benefits to be paid

Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 37.95
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OVERTIME PAY

OVERTIME:

Cement Mason See (B, E, Q, W) on OVERTIME PAGE.

All Others See (B, E, Q) on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following percentage of Journeyman's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of journeyman supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Apprentices indentured before June 1st, 2011 receive full journeyman benefits

11-5wp-b

Mason - Building

02/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Building

07/01/2023

01/01/2024

Wages per hour:

Mosaic & Terrazzo Mechanic

\$ 60.65

\$ 60.57

Mosaic & Terrazzo Finisher

59.04

58.96

SUPPLEMENTAL BENEFITS

Per hour:

Mosaic & Terrazzo Mechanic

\$ 30.26*
+ \$9.16

\$ 31.36*
+ \$9.17

Mosaic & Terrazzo Finisher

\$ 30.26*
+ \$9.15

\$ 31.36*
+ \$9.16

*This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (A, E, Q) on OVERTIME PAGE

07/01/2023- Deduct \$7.25 from hourly wages before calculating overtime.

01/01/2024- Deduct \$7.00 from hourly wages before calculating overtime.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

Easter Sunday is an observed holiday. Holidays falling on a Saturday will be observed on that Saturday. Holidays falling on a Sunday will be celebrated on the Monday.

REGISTERED APPRENTICES

Wages Per hour:

	1st 0- 1500	2nd 1501- 3000	3rd 3001- 3750	4th 3751- 4500	5th 4501- 5250	6th 5251- 6000
07/01/2023	\$ 25.82	\$ 32.19	\$ 36.39	\$ 40.38	\$ 48.52	\$ 54.59
01/01/2024	\$ 25.05	\$ 32.21	\$ 37.93	\$ 38.99	\$ 47.18	\$ 55.38

Supplemental Benefits per hour:

07/01/2023	\$6.00* +\$3.21	\$7.72* +\$4.12	\$18.16* +\$5.50	\$23.27* +\$6.41	\$24.21* +\$7.33	\$27.24* +\$8.29
01/01/2024	\$7.12* +\$3.21	\$9.16* +\$4.12	\$17.22* +\$5.51	\$25.36* +\$6.42	\$26.36* +\$7.34	\$27.36* +\$8.25

*This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/3

Mason - Building	02/01/2024
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JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2023 07/03/2023

Building-Marble Restoration:

Marble, Stone & \$ 47.22 \$ 47.44

Terrazzo Polisher

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:

Building-Marble Restoration:

Marble, Stone & Polisher \$ 30.29 \$ 30.64

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

*ON SATURDAYS, 8TH HOUR AND SUCCESSIVE HOURS PAID AT DOUBLE HOURLY RATE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

1ST TERM APPRENTICE GETS PAID FOR ALL OBSERVED HOLIDAYS.

REGISTERED APPRENTICES

WAGES per hour:

900 hour term at the following wage:

1st	2nd	3rd	4th
1-	901-	1801-	2701
900	1800	2700	
\$ 33.04	\$ 37.78	\$ 42.49	\$ 47.22

Supplemental Benefits Per Hour:

27.65	28.52	29.41	30.29
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07/03/2023

900 hour term at the following wage:

1st	2nd	3rd	4th
1-	901-	1801-	2701
900	1800	2700	
\$ 33.19	\$ 37.95	\$ 42.69	\$ 47.44

Supplemental Benefits Per Hour:

27.99	28.86	29.76	30.64
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9-7/24-MP

Mason - Building	02/01/2024
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JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour: 07/01/2023 7/03/2023

Marble Cutters & Setters

\$ 62.82 \$ 63.12

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 39.03 \$ 39.34

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage Per Hour:

07/01/2023

750 hour terms at the following wage

1st	2nd	3rd	4th	5th	6th	7th	8th
0- 3000	3001- 3750	3751- 4500	4501- 5250	5251- 6000	6001- 6750	6751- 7500	7500+
\$ 26.42	\$ 39.62	\$ 42.91	\$ 46.22	\$ 49.52	\$ 53.38	\$ 59.67	\$ 62.82

Supplemental Benefits per hour:

07/01/2023

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 25.38	\$ 28.86	\$ 29.74	\$ 30.60	\$ 31.48	\$ 36.44	\$ 38.17	\$ 39.03

07/03/2023

Wage Per Hour:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th
0- 3000	3001- 3750	3751- 4500	4501- 5250	5251- 6000	6001- 6750	6751- 7500	7500+
\$ 26.60	\$ 39.82	\$ 43.13	\$ 46.45	\$ 49.78	\$ 53.64	\$ 59.95	\$ 63.12

Supplemental Benefits Per Hour:

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 25.54	\$ 29.09	\$ 29.97	\$ 30.84	\$ 31.72	\$ 36.73	\$ 38.48	\$ 39.34

9-7/4

Mason - Building

02/01/2024

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2023 12/04/2023 06/03/2024

Tile Finisher

\$ 48.36 \$ 48.80

Additional
\$ 0.59

SUPPLEMENTAL BENEFITS

Per Hour: \$ 22.56* \$ 22.71*
+ \$9.86 + \$9.86

*This portion of benefits subject to same premium rate as shown for overtime wages

OVERTIME PAY

See (B, E, Q, *V) on OVERTIME PAGE

*Work beyond 10 hours on a Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

9-7/88A-tf

Mason - Building	02/01/2024
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JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2023	07/03/2023
Marble, Stone, Maintenance Finishers:	\$ 27.26	\$ 27.44

Note 1: An additional \$2.00 per hour
for time spent grinding floor using
"60 grit" and below.

Note 2: Flaming equipment operator
shall be paid an additional \$25.00 per day.

SUPPLEMENTAL BENEFITS

Per Hour:

Marble, Stone Maintenance Finishers:	\$ 14.97	\$ 15.20
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OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

*Double hourly rate after 8 hours on Saturday

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

1st term apprentice gets paid for all observed holidays.

REGISTERED APPRENTICES

WAGES per hour:

	07/01/2023	07/03/2023
0-750	\$ 21.89	\$ 22.04
751-1500	22.60	\$ 22.75
1501-2250	23.32	\$ 23.48
2251-3000	24.04	\$ 24.20
3001-3750	25.11	\$ 25.27
3751-4500	26.54	\$ 26.72
4501+	27.26	\$ 27.44

Supplemental Benefits:

Per hour:

0-750	12.03	\$ 12.24
751-1500	12.43	\$ 12.64
1501-2250	12.82	\$ 13.03
2251-3000	13.21	\$ 13.42
3001-3750	13.80	\$ 14.02
3751-4500	14.58	\$ 14.80
4501+	14.97	\$ 15.20

9-7/24M-MF

Mason - Building / Heavy&Highway	02/01/2024
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JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2023	07/03/2023	01/01/2024
Marble-Finisher	\$ 49.32	\$ 49.65	\$ 49.92

SUPPLEMENTAL BENEFITS

Journeyworker:

Per hour

Marble- Finisher	\$ 36.62	\$ 36.67	\$ 36.93
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OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

Work beyond 8 hours on a Saturday shall be paid at double the rate.

HOLIDAY

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

When an observed holiday falls on a Sunday, it will be observed the next day.

9-7/20-MF

Mason - Heavy&Highway

02/01/2024

JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:

07/01/2023

Bricklayer	\$ 46.39
Cement Mason	46.39
Marble/Stone Mason	46.39
Plasterer	46.39
Pointer/Caulker	46.39

Additional \$1.00 per hour for power saw work

Additional \$0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular workday is mandated or required by state, federal, county, local or other governmental contracts, the following rates apply:

Irregular workday requires 15% premium

Second shift an additional 15% of wage plus benefits to be paid

Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 37.95
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OVERTIME PAY

Cement Mason See (B, E, Q, W)

All Others See (B, E, Q,)

HOLIDAY

Paid: See (5, 6, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

- Whenever any of the above holidays fall on Sunday, they will be observed on Monday. Whenever any of the above holidays fall on Saturday, they will be observed on Friday.

- Supplemental Benefits are not paid for paid Holiday

- If Holiday is worked, Supplemental Benefits are paid for hours worked.

- Whenever an Employee works within three (3) calendar days before a holiday, the Employee shall be paid for the Holiday.

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following percentage of Journeyman's wage

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Supplemental Benefits per hour

750 hour terms at the following percentage of journeyman supplements

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	85%

Apprentices indentured before June 1st, 2011 receive full journeyman benefits

11-5WP-H/H

Operating Engineer - Building**02/01/2024**

JOB DESCRIPTION Operating Engineer - Building**DISTRICT** 9**ENTIRE COUNTIES**

Bronx, Kings, New York, Putnam, Queens, Richmond, Westchester

PARTIAL COUNTIES

Dutchess: that part of Dutchess County lying south of the North City Line of the City of Poughkeepsie.

WAGES

NOTE: Construction surveying

Party Chief--One who directs a survey party

Instrument Man--One who runs the instrument and assists Party Chief.

Rodman--One who holds the rod and assists the Survey Crew

Wages:(Per Hour) 07/01/2023

Building Construction:

Party Chief \$ 77.39

Instrument Man 61.25

Rodman 41.39

Steel Erection:

Party Chief 80.16

Instrument Man 63.60

Rodman 44.23

**Heavy Construction-NYC counties only:
(Foundation, Excavation.)**

Party Chief 85.74

Instrument man 64.40

Rodman 54.90

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

Building Construction \$ 28.04* +\$ 7.65

Steel Erection 28.64* +\$ 7.65

Heavy Construction 28.85* +\$ 7.64

* This portion subject to same premium as wages

Non-Worked Holiday Supplemental Benefit:

21.19

OVERTIME PAY

See (A, B, E, Q) on OVERTIME PAGE

Code "A" applies to Building Construction and has double the rate after 7 hours on Saturdays.

Code "B" applies to Heavy Construction and Steel Erection and had double the rate after 8 hours on Saturdays.

HOLIDAY

Paid: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

9-15Db

Operating Engineer - Building**02/01/2024**

JOB DESCRIPTION Operating Engineer - Building**DISTRICT** 8**ENTIRE COUNTIES**

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES

GROUP I:

Cranes (All Types up to 49 tons), Boom Trucks, Cherry Pickers (All Types), Clamshell Crane, Derrick (Stone and Steel), Dragline, Franki Pile Rig or similar, High Lift (Lull or similar) with crane attachment and winch used for hoisting or lifting, Hydraulic Cranes, Pile Drivers, Potain and similar.

Cranes (All types 50-99 tons), Drill Rig Casa Grande (CAT or similar), Franki Pile Rig or similar, Hydraulic Cranes (All types including Crawler Cranes- No specific boom length).

Cranes (All types 100 tons and over), All Tower Cranes, All Climbing Cranes irrespective of manufacturer and regardless of how the same is rigged, Franki Pile Rig or similar, Conventional Cranes (All types including Crawler Cranes-No specific boom length), Hydraulic Cranes.

GROUP I-A: Barber Green Loader-Euclid Loader, Bulldozer, Carrier-Trailer Horse, Concrete Cleaning Decontamination Machine Operator, Concrete-Portable Hoist, Conway or Similar Mucking Machines, Elevator & Cage, Excavators all types, Front End Loaders, Gradall, Shovel, Backhoe, etc.(Crawler or Truck), Heavy Equipment Robotics Operator/Mechanic, Hoist Engineer-Material, Hoist Portable Mobile Unit, Hoist(Single, Double or Triple Drum), Horizontal Directional Drill Locator, Horizontal Directional Drill Operator and Jersey Spreader, Letourneau or Tournapull(Scrapers over 20 yards Struck), Lift Slab Console, etc., Lull HiLift or Similar, Master Environmental Maintenance Mechanics, Mucking Machines Operator/Mechanic or Similar Type, Overhead Crane, Pavement Breaker(Air Ram), Paver(Concrete), Post Hole Digger, Power House Plant, Road Boring Machine, Road Mix Machine, Ross Carrier and Similar Machines, Rubber tire double end backhoes and similar machines, Scoopmobile Tractor-Shovel Over 1.5 yards, Shovel (Tunnels), Spreader (Asphalt) Telephie(Cableway), Tractor Type Demolition Equipment, Trenching Machines-Vermeer Concrete Saw Trencher and Similar, Ultra High Pressure Waterjet Cutting Tool System, Vacuum Blasting Machine operator/mechanic, Winch Truck A Frame.

GROUP I-B: Compressor (Steel Erection), Mechanic (Outside All Types), Negative Air Machine (Asbestos Removal), Push Button (Buzz Box) Elevator.

GROUP II: Compactor Self-Propelled, Concrete Pump, Crane Operator in Training (Over 100 Tons), Grader, Machines Pulling Sheep's Foot Roller, Roller (4 ton and over), Scrapers (20 yards Struck and Under), Vibratory Rollers, Welder.

GROUP III-A: Asphalt Plant, Concrete Mixing Plants, Forklift (All power sources), Joy Drill or similar, Tractor Drilling Machine, Loader (1 1/2 yards and under), Portable Asphalt Plant, Portable Batch Plant, Portable Crusher, Skid Steer (Bobcat or similar), Stone Crusher, Well Drilling Machine, Well Point System.

GROUP III-B: Compressor Over 125 cu. Feet, Conveyor Belt Machine regardless of size, Compressor Plant, Ladder Hoist, Stud Machine.

GROUP IV-A: Batch Plant, Concrete Breaker, Concrete Spreader, Curb Cutter Machine, Finishing Machine-Concrete, Fine Grading Machine, Hepa Vac Clean Air Machine, Material Hopper(sand, stone, cement), Mulching Grass Spreader, Pump Gypsum etc, Pump-Plaster-Grout-Fireproofing. Roller(Under 4 Ton),Spreading and Fine Grading Machine, Steel Cutting Machine, Siphon Pump, Tar Joint Machine, Television Cameras for Water, Sewer, Gas etc. Turbo Jet Burner or Similar Equipment, Vibrator (1 to 5).

GROUP IV-B: Compressor (all types), Heater (All Types), Fire Watchman, Lighting Unit (Portable & Generator) Pump, Pump Station(Water, Sewer, Portable, Temporary), Welding Machine (Steel Erection & Excavation).

GROUP V: Mechanics Helper, Motorized Roller (walk behind), Stock Attendant, Welder's Helper, Maintenance Engineer Crane(75 ton and over).

Group VI-A: Welder Certified

GROUP VI-B: Utility Man, Warehouse Man.

WAGES: (per hour)

	07/01/2023	03/04/2024
GROUP I		
Cranes- up to 49 tons	\$ 66.23	\$ 67.43
Cranes- 50 tons to 99 tons	68.53	69.77
Cranes- 100 tons and over	78.21	79.64
GROUP I-A	58.01	59.04
GROUP I-B	53.48	54.41
GROUP II	55.98	56.97
GROUP III-A	53.94	54.88
GROUP III-B	51.35	52.25
GROUP IV-A	53.40	54.33
GROUP IV-B	45.17	45.94
GROUP V	48.69	49.53

Group VI-A	56.96	57.96
GROUP VI-B		
Utility Man	46.21	47.00
Warehouse Man	48.52	49.26

An additional 20% to wage when required to wear protective equipment on hazardous/toxic waste projects.
Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional \$2.00 per hour.
Engineers operating cranes with booms 149 feet or over in length will be paid an additional \$3.00 per hour.
Loader operators over 5 cubic yard capacity additional .50 per hour.
Shovel operators over 4 cubic yard capacity additional \$1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	\$ 31.57	\$ 32.32
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OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

8-137B

Operating Engineer - Heavy&Highway

02/01/2024

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES

GROUP I: Boom Truck, Cherry Picker, Clamshell, Crane, (Crawler, Truck),
Dragline, Drill Rig (Casa Grande, Cat, or Similar), Floating Crane (Crane on Barges) under 100 tons, Gin Pole, Hoist Engineer-Concrete (Crane-Derrick-Mine Hoist), Knuckle Boom Crane, Rough Terrain Crane.

GROUP I-A: Auger (Truck or Truck Mounted), Boat Captain, Bulldozer-All Sizes, Central Mix Plant Operator, Chipper (all types), Close Circuit T.V., Combination Loader/Backhoe, Compactor with Blade, Concrete Finishing Machine, Gradall, Grader (Motor Grader), Elevator & Cage (Materials or Passenger), Excavator (and all attachments), Front End Loaders (1 1/2 yards and over), High Lift Lull and similar, Hoist (Single, Double, Triple Drum), Hoist Portable Mobile Unit, Hoist Engineer (Material), Jack and Bore Machine, Log Skidders, Mill Machines, Mucking Machines, Overhead Crane, Paver (concrete), Post Pounder (of any type), Push Cats, Road Reclaimer, Robot Hammer (Brokk or similar), Robotic Equipment (Scope of Engineer Schedule), Ross Carrier and similar, Scrapers (20 yard struck and over), Side Boom, Slip Form Machine, Spreader (Asphalt), Trenching Machines (Telephies-Vermeer Concrete Saw), Tractor Type Demolition Equipment, Vacuum Truck. Vibratory Roller(Riding) or Roller used in mainline paving operations.

GROUP I-B: Asphalt Mobile Conveyor/Transfer Machine, Road Paver (Asphalt).

GROUP II-A: Ballast Regulators, Compactor Self Propelled, Fusion Machine, Rail Anchor Machines, Roller (4 ton and over), Scrapers (20 yard struck and under).

GROUP II-B: Mechanic (Outside) All Types, Shop Mechanic.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler (High Pressure), Concrete Breaker (Track or Rubber Tire), Concrete Pump, Concrete Spreader, Excavator Drill, Farm Tractor, Forklift (all types), Gas Tapping (Live), Hydroseeder, Loader (1 1/2 yards and under), Locomotive (all sizes), Machine Pulling Sheeps Foot Roller, Portable Asphalt Plant, Portable Batch Plant, Portable Crusher (Apprentice), Powerhouse Plant, Roller (under 4 ton), Sheer Excavator, Skid Steer/Bobcat, Stone Crusher, Sweeper (with seat), Well Drilling Machine.

GROUP IV: Service Person (Grease Truck), Deckhand.

GROUP IV-B: Conveyor Belt Machine (Truck Mounted), Heater (all types), Lighting Unit (Portable), Maintenance Engineer (For Crane Only), Mechanics Helper, Pump (Fireproofing), Pumps-Pump Station/Water/Sewer/Gypsum/Plaster, etc., Pump Truck (Sewer Jet or Similar), Welders Helper, Welding Machine (Steel Erection), Well Point System.

GROUP V: All Tower Cranes-All Climbing Cranes and all cranes of 100-ton capacity or greater (3900 Manitowac or similar) irrespective of manufacturer and regardless of how the same is rigged, Hoist Engineer (Steel), Engineer-Pile Driver, Jersey Spreader, Pavement Breaker/Post Hole Digger.

WAGES: Per hour:	07/01/2023	03/04/2024
Group I	\$ 67.27	\$ 68.63
Group I-A	59.26	60.42
Group I-B	62.46	63.70
Group II-A	56.74	57.84
Group II-B	58.52	59.67
Group III	55.74	56.81
Group IV	50.63	51.57
Group IV-B	43.43	44.19
Group V		
Engineer All Tower, Climbing and Cranes of 100 Tons	76.24	77.82
Hoist Engineer(Steel)	69.01	70.41
Engineer(Pile Driver)	73.61	75.13
Jersey Spreader, Pavement Breaker (Air Ram)Post Hole Digger	58.06	59.19

SHIFT DIFFERENTIAL:

A 15% premium on all hours paid, including overtime hours for 2nd, 3rd shifts
on all government mandated off-shift work

Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional \$2.00 per hour over the rate listed in the Wage Schedule. Engineers operating cranes with booms 149 feet or over in length will be paid an additional \$3.00 per hour over the rate listed in the Wage Schedule. Loader and Excavator Operators: over 5 cubic yards capacity \$0.50 per hour over the rate listed in the Wage Schedule. Shovel Operators: over 4 cubic yards capacity \$1.00 per hour over the rate listed in the Wage Schedule.

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:	\$ 33.75 up to 40 Hours	\$ 34.85 up to 40 hours
	After 40 hours \$ 24.50* PLUS \$ 1.25 on all hours worked	After 40 hours \$ 25.55* PLUS \$ 1.25 on all hours worked

*This amount is subject to premium

OVERTIME PAY

See (B, E, P, *R, **U) on OVERTIME PAGE

HOLIDAY

Paid:..... See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

Overtime..... See (5, 6, 8, 15, 25, 26) on OVERTIME PAGE

* For Holiday codes 8,15,25,26 code R applies

** For Holiday Codes 5 & 6 code U applies

Note: If employees are required to work on Easter Sunday they shall be paid at the rate of triple time.

REGISTERED APPRENTICES

(1)year terms at the following rate.

1st term	\$ 29.63	\$ 30.21
2nd term	35.56	36.25
3rd term	41.48	42.30
4th term	47.41	48.34
Supplemental Benefits per hour:		
	25.70	26.85

Operating Engineer - Heavy&Highway

02/01/2024

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: South of the North city line of Poughkeepsie

WAGES

Party Chief - One who directs a survey party

Instrument Man - One who runs the instrument and assists Party Chief

Rodman - One who holds the rod and in general, assists the Survey Crew

Categories cover GPS & Underground Surveying

Per Hour: 07/01/2023

Party Chief \$ 81.72

Instrument Man 61.43

Rodman 52.40

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

All Categories

Straight Time: \$ 25.25* + \$7.64

Premium:

Time & 1/2 \$ 37.88* + \$7.64

Double Time

\$ 50.50* + \$7.64

Non-Worked Holiday Supplemental Benefits:

\$ 21.19

OVERTIME PAY

See (B, *E, Q) on OVERTIME PAGE

* Doubletime paid on all hours in excess of 8 hours on Saturday

HOLIDAY

Paid: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

Overtime: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

9-15Dh

Operating Engineer - Heavy&Highway - Tunnel

02/01/2024

JOB DESCRIPTION Operating Engineer - Heavy&Highway - Tunnel

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES

GROUP I: Boom Truck, Cherry Picker, Clamshell, Crane(Crawler, Truck), Dragline, Drill Rig Casa Grande(Cat or Similar), Floating Crane(Crane on Barge-Under 100 Tons), Hoist Engineer(Concrete/Crane-Derrick-Mine Hoist), Knuckle Boom Crane, Rough Terrain Crane.

GROUP I-A: Auger(Truck or Truck Mounted), Boat Captain, Bull Dozer-all sizes, Central Mix Plant Operator, Chipper-all types, Close Circuit T.V., Combination Loader/Backhoe, Compactor with Blade, Concrete Finishing Machine, Gradall, Grader(Motor Grader), Elevator & Cage(Materials or Passengers), Excavator(and all attachments), Front End Loaders(1 1/2 yards and over), High Lift Lull, Hoist(Single, Double, Triple Drum), Hoist Portable Mobile Unit, Hoist Engineer(Material), Jack and Bore Machine, Log Skidder, Milling Machine, Moveable Concrete Barrier Transfer & Transport Vehicle, Mucking Machines. Overhead Crane, Paver(Concrete), Post Pounder of any type, Push Cats, Road Reclaimer, Robot Hammer(Brokk or similar), Robotic Equipment(Scope of Engineer Schedule), Ross Carrier and similar machines, Scrapers(20 yards struck and over), Side Boom, Slip Form Machine, Spreader(Asphalt), Trenching Machines, Telephies-Vermeer Concrete Saw, Tractor type demolition equipment, Vacuum Truck, Vibratory Roller (Riding) used in mainline paving operations.

GROUP I-B: Asphalt Mobile Conveyor/Transfer Machine, Road Paver(Asphalt).

GROUP II-A: Ballast Regulators, Compactor(Self-propelled), Fusion Machine, Rail Anchor Machines, Roller(4 ton and over), Scrapers(20 yard struck and under).

GROUP II-B: Mechanic(outside)all types, Shop Mechanic.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler(High Pressure), Concrete Breaker(Track or Rubber Tire), Concrete Pump, Concrete Spreader, Excavator Drill, Farm Tractor, Forklift(all types of power), Gas Tapping(Live), Hydroseeder, Loader(1 1/2 yards and under), Locomotive(all sizes), Machine Pulling Sheeps Foot Roller, Portable Asphalt Plant, Portable Batch Plant, Portable Crusher(Apprentice), Powerhouse Plant, Roller(under 4 ton), Sheer Excavator, Skidsteer/Bobcat, Stone Crusher, Sweeper(with seat), Well Drilling Machine.

GROUP IV-A: Service Person(Grease Truck), Deckhand.

GROUP IV-B: Conveyor Belt Machine(Truck Mounted), Heater(all types), Lighting Unit(Portable), Maintenance Engineer(for Crane only), Mechanics Helper, Pump(Fireproofing), Pumps-Pump Station/Water/Sewer/Gypsum/Plaster, etc., Pump Truck(Sewer Jet or similar), Welding Machine(Steel Erection), Welders Helper.

GROUP V-A: Engineer(all Tower Cranes, all Climbing Cranes & all Cranes of 100 ton capacity or greater),Hoist Engineer(Steel-Sub Structure), Engineer-Pile Driver, Jersey-Spreader, Pavement breaker, Post Hole Digger

WAGES: (per hour)

	07/01/2023	03/04/2024
GROUP I	\$ 67.27	\$ 68.63
GROUP I-A	59.26	60.42
GROUP I-B	62.46	63.70
GROUP II-A	56.74	57.84
GROUP II-B	58.52	59.67
GROUP III	55.74	56.81
GROUP IV-A	50.63	51.57
GROUP IV-B	43.43	44.19
GROUP V-A		
Engineer-Cranes	76.24	77.82
Engineer-Pile Driver	73.61	75.13
Hoist Engineer	69.01	70.41
Jersey Spreader/Post Hole Digger	58.06	59.19

SHIFT DIFFERENTIAL:

A 15% premium on all hours paid, including overtime hours for 2nd, 3rd shifts
on all government mandated off-shift work

An additional 20% to wage when required to wear protective equipment on hazardous/toxic waste projects. Operators required to use two buckets pouring concrete on other than road pavement shall receive \$0.50 per hour over scale. Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional \$2.00 per hour. Engineers operating cranes with booms 149 feet or over in length will be paid an additional \$3.00 per hour. Operators of shovels with a capacity over (4) cubic yards shall be paid an additional \$1.00 per hour. Operators of loaders with a capacity over (5) cubic yards shall be paid an additional \$0.50 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:

\$ 33.75 up to 40 hours	\$ 34.85 up to 40 hours
After 40 hours	After 40 hours
\$24.50 plus	\$25.55 plus
\$1.25 on all hours worked	\$1.25 on all hours worked

OVERTIME PAY

See (D, O, *U, V) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

* Note: For Holiday codes 5 & 6, code U applies. For Holiday codes 8, 15, 25, 26, code R applies.

Note: If employees are required to work on Easter Sunday, they shall be paid at the rate of triple time.

REGISTERED APPRENTICES

(1)year terms at the following rates:

1st term	\$ 29.63	\$ 30.21
2nd term	35.56	36.25
3rd term	41.48	42.30
4th term	47.41	48.34

Supplemental Benefits per hour:

All terms	\$ 25.70	\$ 26.85
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8-137Tun

Operating Engineer - Marine Dredging

02/01/2024

JOB DESCRIPTION Operating Engineer - Marine Dredging

DISTRICT 4

ENTIRE COUNTIES

Albany, Bronx, Cayuga, Clinton, Columbia, Dutchess, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Orange, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES

These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2023	10/01/2023
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	\$ 43.94	\$ 45.26
CLASS A2 Crane Operator (360 swing)	39.16	40.33
CLASS B Dozer, Front Loader Operator on Land	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing) Spider/Spill Barge Operator Operator II, Fill Placer, Engineer, Chief Mate, Electrician, Chief Welder, Maintenance Engineer Licensed Boat, Crew Boat Operator	38.00	39.14
CLASS B2 Certified Welder	35.77	36.84
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	34.79	35.83
CLASS C2 Boat Operator	33.67	34.68
CLASS D Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor	27.97	28.81

SUPPLEMENTAL BENEFITS

Per Hour:

THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes A & B	\$ 11.85 plus 6% of straight time	\$ 12.00 plus 6% of straight time
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	wage, Overtime hours add \$ 0.63	wage, Overtime hours add \$ 0.63
All Class C	\$ 11.60 plus 6% of straight time wage, Overtime hours add \$ 0.50	\$ 11.75 plus 6% of straight time wage, Overtime hours add \$ 0.50
All Class D	\$ 11.35 plus 6% of straight time wage, Overtime hours add \$ 0.38	\$ 11.60 plus 6% of straight time wage, Overtime hours add \$ 0.50

OVERTIME PAY

See (B2, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

Operating Engineer - Survey Crew - Consulting Engineer

02/01/2024

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES

Dutchess: That part in Dutchess County lying South of the North City line of Poughkeepsie.

WAGES

Feasibility and preliminary design surveying, any line and grade surveying for inspection or supervision of construction.

Per hour: 07/01/2023
Survey Classifications

Party Chief \$ 47.15
Instrument Man 39.30
Rodman 34.35

SUPPLEMENTAL BENEFITS

Per Hour:

All Crew Members: \$ 23.15

OVERTIME PAY

OVERTIME:.... See (B, E*, Q, V) ON OVERTIME PAGE.

*Double-time paid on the 9th hour on Saturday.

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

9-15dconsult

Painter

02/01/2024

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2023

Brush \$ 51.70*

Abatement/Removal of lead based
or lead containing paint on
materials to be repainted. 51.70*

Spray & Scaffold	\$ 54.70*
Fire Escape	54.70*
Decorator	54.70*
Paperhanger/Wall Coverer	54.48*

*Subtract \$ 0.10 to calculate premium rate.

SUPPLEMENTAL BENEFITS

Per hour:

Paperhanger	\$ 34.60
All others	32.73
Premium	36.70**

**Applies only to "All others" category, not paperhanger journeyworker.

OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One (1) year terms at the following wage rate.

Per hour:	07/01/2023
Appr 1st term...	\$ 19.95*
Appr 2nd term...	25.56*
Appr 3rd term...	31.05*
Appr 4th term...	41.62*

*Subtract \$ 0.10 to calculate premium rate.

Supplemental benefits:

Per Hour:

Appr 1st term...	\$ 16.06
Appr 2nd term...	19.95
Appr 3rd term...	23.02
Appr 4th term...	29.16

8-NYDC9-B/S

Painter

02/01/2024

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Putnam, Suffolk, Westchester

PARTIAL COUNTIES

Nassau: All of Nassau except the areas described below: Atlantic Beach, Ceaderhurst, East Rockaway, Gibson, Hewlett, Hewlett Bay, Hewlett Neck, Hewlett Park, Inwood, Lawrence, Lido Beach, Long Beach, parts of Lynbrook, parts of Oceanside, parts of Valley Stream, and Woodmere. Starting on the South side of Sunrise Hwy in Valley Stream running east to Windsor and Rockaway Ave., Rockville Centre is the boundary line up to Lawson Blvd. turn right going west all the above territory. Starting at Union Turnpike and Lakeville Rd. going north to Northern Blvd. the west side of Lakeville road to Northern blvd. At Northern blvd. going east the district north of Northern blvd. to Port Washington Blvd. West of Port Washington blvd.to St.Francis Hospital then north of first traffic light to Port Washington and Sands Point, Manor HAVen, Harbour Acres.

WAGES

Per hour:	07/01/2023
Drywall Taper	\$ 51.45*

*Subtract \$ 0.10 to calculate premium rate.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 30.88
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OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages - Per Hour:

1500 hour terms at the following wage rate:

1st term	\$ 19.95*
2nd term	25.56*
3rd term	31.00*
4th term	41.52*

*Subtract \$ 0.10 to calculate premium rate.

Supplemental Benefits - Per hour:

One year term (1500 hours) at the following dollar amount.

1st year	\$ 15.22
2nd year	18.90
3rd year	21.81
4th year	27.58

8-NYDCT9-DWT

Painter - Bridge & Structural Steel

02/01/2024

JOB DESCRIPTION Painter - Bridge & Structural Steel

DISTRICT 8

ENTIRE COUNTIES

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per Hour:

STEEL:

Bridge Painting:	07/01/2023	10/01/2023
	\$ 54.50	\$ 56.00
	+ 10.10*	+ 10.35*

ADDITIONAL \$6.50 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

NOTE: All premium wages are to be calculated on base rate per hour only.

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

NOTE: Generally, for Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

SHIFT WORK:

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:	\$ 11.78	\$ 12.43
	+ 30.85*	+ 31.55*

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage - Per hour:

Apprentices: (1) year terms.

1st year	\$ 21.80 + 4.04	\$ 22.40 + 4.14
2nd year	\$ 32.70 + 6.06	\$ 33.60 + 6.21
3rd year	\$ 43.60 + 8.08	\$ 44.80 + 8.28
Supplemental Benefits - Per hour:		
1st year	\$.90 + 12.34	\$ 1.16 + 12.62
2nd year	\$ 7.07 + 18.51	\$ 7.46 + 18.93
3rd year	\$ 9.42 + 24.68	\$ 9.94 + 25.24

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

Painter - Line Striping

02/01/2024

JOB DESCRIPTION Painter - Line Striping

DISTRICT 8

ENTIRE COUNTIES

Albany, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Nassau, Orange, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per hour:

Painter (Striping-Highway):	07/01/2023	01/01/2024	07/01/2024
Striping-Machine Operator*	\$ 31.53	\$ 31.53	\$ 34.12
Linerman Thermoplastic	38.34	38.34	41.12

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

NOTE - The "Employer Registration" (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker:

Striping Machine Operator:	\$ 10.03	\$ 22.24	\$ 23.65
Linerman Thermoplastic:	10.03	22.24	23.65

OVERTIME PAY

See (B, B2, E2, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 20) on HOLIDAY PAGE
Overtime: See (5, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES

One (1) year terms at the following wage rates:

1st Term:	\$ 15.00	\$ 15.00	\$ 15.00
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2nd Term:	18.92	18.92	20.47
3rd Term:	25.22	25.22	27.30

Supplemental Benefits per hour:

1st term:	\$ 9.16	\$ 22.24	\$ 23.65
2nd Term:	10.03	22.24	23.65
3rd Term:	10.03	22.24	23.65

8-1456-LS

Painter - Metal Polisher

02/01/2024

JOB DESCRIPTION Painter - Metal Polisher

DISTRICT 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

07/01/2023

Metal Polisher	\$ 38.18
Metal Polisher*	39.28
Metal Polisher**	42.18

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

Journeyworker:

All classification \$ 12.34

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year term at the following wage rates:

07/01/2023

1st year	\$ 16.00
2nd year	17.00
3rd year	18.00

1st year*	\$ 16.39
2nd year*	17.44
3rd year*	18.54

1st year**	\$ 18.50
2nd year**	19.50
3rd year**	20.50

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:

Per hour:

1st year	\$ 8.69
2nd year	8.69
3rd year	8.69

8-8A/28A-MP

Plumber	02/01/2024
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JOB DESCRIPTION Plumber

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

Per hour:

07/01/2023

Plumber and

Steamfitter

\$ 62.36

SHIFT WORK:

When directly specified in public agency or authority contract documents, shift work outside the regular hours of work shall be comprised of eight (8) hours per shift not including Saturday, Sundays and holidays. One half (1/2) hour shall be allowed for lunch after the first four (4) hours of each shift. Wage and Fringes for shift work shall be straight time plus a shift premium of twenty-five (25%) percent. A minimum of five days Monday through Friday must be worked to establish shift work.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker

\$ 41.51

OVERTIME PAY

See (B, E, E2, Q, V) on OVERTIME PAGE

OVERTIME:... See on OVERTIME PAGE.

HOLIDAY

Paid:

See (1) on HOLIDAY PAGE

Overtime:

See (5, 6, 8, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1)year terms at the following wages:

1st Term

\$ 23.20

2nd Term

26.61

3rd Term

30.74

4th Term

43.81

5th Term

46.99

Supplemental Benefits per hour:

1st term

\$ 17.12

2nd term

19.12

3rd term

22.74

4th term

30.02

5th term

31.82

8-21.1-ST

Plumber - HVAC / Service	02/01/2024
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JOB DESCRIPTION Plumber - HVAC / Service

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Putnam, Westchester

PARTIAL COUNTIES

Delaware: Only the townships of Middletown and Roxbury

Ulster: Entire County(including Walkill and Shawangunk Prisons) except for remainder of Town of Shawangunk and Towns of Plattekill, Marlboro, and Wawarsing.

WAGES

Per hour:

07/01/2023

HVAC Service

\$ 42.68

+ \$ 4.37*

*Note: This portion of wage is not subject to overtime premium.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker HVAC Service

\$ 28.99

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

HVAC SERVICE

(1)year terms at the following wages:

1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.
\$ 19.32	\$ 22.91	\$ 28.56	\$ 35.13	\$ 38.15
+\$2.39*	+\$2.70*	+\$3.25*	+\$3.88*	+\$4.12*

*Note: This portion of wage is not subject to overtime premium.

Supplemental Benefits per hour:

Apprentices 07/01/2023

1st term	\$ 20.84
2nd term	22.28
3rd term	23.85
4th term	26.01
5th term	27.55

8-21.1&2-SF/Re/AC

Plumber - Jobbing & Alterations

02/01/2024

JOB DESCRIPTION Plumber - Jobbing & Alterations

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Putnam, Westchester

PARTIAL COUNTIES

Ulster: Entire county (including Wallkill and Shawangunk Prisons in Town of Shawangunk) EXCEPT for remainder of Town of Shawangunk, and Towns of Plattekill, Marlboro, and Wawarsing.

WAGES

Per hour: 07/01/2023
Journeyworker: \$ 48.51

Repairs, replacements and alteration work is any repair or replacement of a present plumbing system that does not change existing roughing or water supply lines.

SHIFT WORK:

When directly specified in public agency or authority contract documents, shift work outside the regular hours of work shall be comprised of eight (8) hours per shift not including Saturday, Sundays and holidays. One half (1/2) hour shall be allowed for lunch after the first four (4) hours of each shift. Wage and Fringes for shift work shall be straight time plus a shift premium of twenty-five (25%) percent. A minimum of five days Monday through Friday must be worked to establish shift work.

SUPPLEMENTAL BENEFITS

Per hour:
Journeyworker

\$ 34.76

OVERTIME PAY

See (B, *E, E2, Q, V) on OVERTIME PAGE

*When used as a make-up day, hours after 8 on Saturday shall be paid at time and one half.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following wages:

1st year	\$ 20.92
2nd year	23.24
3rd year	25.29

4th year	35.48
5th year	37.49

Supplemental Benefits per hour:

1st year	\$ 11.45
2nd year	13.46
3rd year	17.51
4th year	23.67
5th year	25.68

8-21.3-J&A

Roofer

02/01/2024

JOB DESCRIPTION Roofer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, New York, Orange, Putnam, Queens, Richmond, Rockland, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2023	05/01/2024
		Additional
Roofer/Waterproofer	\$ 46.50	\$2.50
	+ \$7.00*	

* This portion is not subjected to overtime premiums.

Note: Abatement/Removal of Asbestos containing roofs and roofing material is classified as Roofer.

SUPPLEMENTAL BENEFITS

Per Hour:	\$ 31.37
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OVERTIME PAY

See (B, H) on OVERTIME PAGE

Note: An observed holiday that falls on a Sunday will be observed the following Monday.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year term apprentices indentured prior to 01/01/2023

	1st	2nd	3rd	4th
	\$ 16.28	\$ 23.25	\$ 27.90	\$ 34.88
		+ 3.50*	+ 4.20*	+ 5.26*
Supplements:				
	1st	2nd	3rd	4th
	\$ 4.03	\$ 15.85	\$ 18.95	\$ 23.61

* This portion is not subjected to overtime premiums.

(1) year term apprentices indentured after 01/01/2023

	1st	2nd	3rd	4th	5th
	\$ 17.67	\$ 20.93	\$ 23.25	\$ 27.90	\$ 34.88
		+ 3.16*	+ 3.50*	+ 4.20*	+ 5.26
Supplements:					
	1st	2nd	3rd	4th	5th
	\$ 7.61	\$ 14.29	\$ 15.85	\$ 18.95	\$ 23.61

* This portion is not subjected to overtime premiums.

9-8R

Sheetmetal Worker

02/01/2024

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

	07/01/2023
SheetMetal Worker	\$ 47.00
	+ 3.60*

*This portion is not subject to overtime premiums.

SHIFT WORK

For all NYS D.O.T. and other Governmental mandated off-shift work:
10% increase for additional shifts for a minimum of five (5) days

SUPPLEMENTAL BENEFITS

Journeyworker \$ 45.62

OVERTIME PAY

OVERTIME:.. See (B, E, Q,) on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 15, 16, 23) on HOLIDAY PAGE

REGISTERED APPRENTICES

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 17.50	\$ 19.67	\$ 21.87	\$ 24.05	\$ 26.24	\$ 28.44	\$ 31.10	\$ 33.75
+ 1.44*	+ 1.62*	+ 1.80*	+ 1.98*	+ 2.16*	+ 2.34*	+ 2.52*	+ 2.70*

*This portion is not subject to overtime premiums.

Supplemental Benefits per hour:

Apprentices

1st term	\$ 19.53
2nd term	21.99
3rd term	24.42
4th term	26.88
5th term	29.32
6th term	31.75
7th term	33.72
8th term	35.71

8-38

Sheetmetal Worker

02/01/2024

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2023

Sign Erector \$ 56.00

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTURAL IRON WORKER CLASS)

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2023

Sign Erector \$ 55.66

OVERTIME PAY

See (A, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:

6 month Terms at the following percentage of Sign Erectors wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
35%	40%	45%	50%	55%	60%	65%	70%	75%	80%

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2023

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
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\$ 14.95	\$ 16.95	\$ 18.93	\$ 20.93	\$ 28.56	\$ 31.05	\$ 33.57	\$ 36.05	\$ 38.56	\$ 41.05
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4-137-SE

Sprinkler Fitter	02/01/2024
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JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

Per hour 07/01/2023

Sprinkler \$ 50.86
Fitter

SUPPLEMENTAL BENEFITS

Per hour

Journeyperson \$ 30.19

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES

Wages per hour

One Half Year terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 24.77	\$ 27.53	\$ 30.03	\$ 32.78	\$ 35.53	\$ 38.29	\$ 41.04	\$ 43.79	\$ 46.54	\$ 49.30

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.74	\$ 8.74	\$ 20.32	\$ 20.32	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57	\$ 20.57
									1-669.2

Teamster - Building / Heavy&Highway	02/01/2024
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JOB DESCRIPTION Teamster - Building / Heavy&Highway

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

GROUP A: Straight Trucks (6-wheeler and 10-wheeler), A-frame, Winch, Dynamite Seeding, Mulching, Agitator, Water, Attenuator, Light Towers, Cement (all types), Suburban, Station Wagons, Cars, Pick Ups, any vehicle carrying materials of any kind.

GROUP AA: Tack Coat

GROUP B: Tractor & Trailers (all types).

GROUP BB: Tri-Axle, 14 Wheeler

GROUP C: Low Boy (carrying equipment).

GROUP D: Fuel Trucks, Tire Trucks.

GROUP E: Off-road Equipment (over 40 tons): Athey Wagons, Belly Dumps, Articulated Dumps, Trailer Wagons.

GROUP F: Off-road Equipment (over 40 tons) Euclid, DJB.

GROUP G: Off-road Equipment (under 40 tons) Athey Wagons, Belly Articulated Dumps, Trailer Wagons.

GROUP H: Off-road Equipment (under 40 tons), Euclid.

GROUP HH: Off-road Equipment (under 40 tons) D.J.B.

GROUP I: Off-road Equipment (under 40 tons) Darts.

GROUP II: Off-road Equipment (under 40 tons) RXS.

WAGES:(per hour)

07/01/2023

GROUP A \$ 46.86*

GROUP AA	49.86*
GROUP B	47.48*
GROUP BB	46.98*
GROUP C	49.61*
GROUP D	47.31*
GROUP E	47.86*
GROUP F	48.86*
GROUP G	47.61*
GROUP H	48.23*
GROUP HH	48.61*
GROUP I	48.36*
GROUP II	48.73*

* To calculate premium wage, subtract \$.10 from the hourly wage.

Note: Fuel truck operators on construction sites addit. \$5.00 per day.
For work on hazardous/toxic waste site addit. 20% of hourly rate.

Shift Differential: When mandated by the contracting agency, DOT, or any governmental agency contracts shall receive a shift differential of fifteen (15%) above the wage rate.

NOTE: The Employer Registration (30.1) use of a '4 Day/10 Hour Work schedules' will no longer be accepted or processed. All registered projects prior to June 30,2023 will expire within the granted time frame.

For Pre-Registered Projects Four (4), Ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day. For further clarification contact your local Bureau Office.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker

First 40 hours	\$ 35.58
41st-45th hours	15.73
Over 45 hours	1.60

OVERTIME PAY

See (B, E, P, R) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25) on HOLIDAY PAGE

8-456

Welder

02/01/2024

JOB DESCRIPTION Welder

DISTRICT 1

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour 07/01/2023

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

- (AA) Time and one half of the hourly rate after 7 and one half hours per day
- (A) Time and one half of the hourly rate after 7 hours per day
- (B) Time and one half of the hourly rate after 8 hours per day
- (B1) Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday.
Double the hourly rate for all additional hours
- (B2) Time and one half of the hourly rate after 40 hours per week
- (C) Double the hourly rate after 7 hours per day
- (C1) Double the hourly rate after 7 and one half hours per day
- (D) Double the hourly rate after 8 hours per day
- (D1) Double the hourly rate after 9 hours per day
- (E) Time and one half of the hourly rate on Saturday
- (E1) Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
- (E2) Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E3) Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
- (E4) Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E5) Double time after 8 hours on Saturdays
- (F) Time and one half of the hourly rate on Saturday and Sunday
- (G) Time and one half of the hourly rate on Saturday and Holidays
- (H) Time and one half of the hourly rate on Saturday, Sunday, and Holidays
- (I) Time and one half of the hourly rate on Sunday
- (J) Time and one half of the hourly rate on Sunday and Holidays
- (K) Time and one half of the hourly rate on Holidays
- (L) Double the hourly rate on Saturday
- (M) Double the hourly rate on Saturday and Sunday
- (N) Double the hourly rate on Saturday and Holidays
- (O) Double the hourly rate on Saturday, Sunday, and Holidays
- (P) Double the hourly rate on Sunday
- (Q) Double the hourly rate on Sunday and Holidays
- (R) Double the hourly rate on Holidays
- (S) Two and one half times the hourly rate for Holidays

- (S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
- (T) Triple the hourly rate for Holidays
- (U) Four times the hourly rate for Holidays
- (V) Including benefits at SAME PREMIUM as shown for overtime
- (W) Time and one half for benefits on all overtime hours.
- (X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

- (1) None
- (2) Labor Day
- (3) Memorial Day and Labor Day
- (4) Memorial Day and July 4th
- (5) Memorial Day, July 4th, and Labor Day
- (6) New Year's, Thanksgiving, and Christmas
- (7) Lincoln's Birthday, Washington's Birthday, and Veterans Day
- (8) Good Friday
- (9) Lincoln's Birthday
- (10) Washington's Birthday
- (11) Columbus Day
- (12) Election Day
- (13) Presidential Election Day
- (14) 1/2 Day on Presidential Election Day
- (15) Veterans Day
- (16) Day after Thanksgiving
- (17) July 4th
- (18) 1/2 Day before Christmas
- (19) 1/2 Day before New Years
- (20) Thanksgiving
- (21) New Year's Day
- (22) Christmas
- (23) Day before Christmas
- (24) Day before New Year's
- (25) Presidents' Day
- (26) Martin Luther King, Jr. Day
- (27) Memorial Day
- (28) Easter Sunday

(29) Juneteenth

New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12226

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By:

(Check Only One) ☐ Contracting Agency ☐ Architect or Engineering Firm ☐ Public Work District Office Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone

Fax

E-Mail:

2. NY State Units (see Item 5).

☐ 01 DOT

☐ 02 OGS

☐ 03 Dormitory Authority

☐ 04 State University
Construction Fund

☐ 05 Mental Hygiene
Facilities Corp.

☐ 06 OTHER N.Y. STATE UNIT

☐ 07 City

☐ 08 Local School District

☐ 09 Special Local District, i.e.,
Fire, Sewer, Water District

☐ 10 Village

☐ 11 Town

☐ 12 County

☐ 13 Other Non-N.Y. State
(Describe)

3. SEND REPLY TO ☐ (check if new or change)
Name and complete address:

Telephone

Fax

E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

☐ New Schedule of Wages and Supplements.

APPROXIMATE BID DATE :

☐ Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR
THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title

Description of Work

Contract Identification Number

Note: For NYS units, the OSC Contract No.

6. Location of Project:

Location on Site

Route No/Street Address

Village or City

Town

County

7. Nature of Project - Check One:

- ☐ 1. New Building
☐ 2. Addition to Existing Structure
☐ 3. Heavy and Highway Construction (New and Repair)
☐ 4. New Sewer or Waterline
☐ 5. Other New Construction (Explain)
☐ 6. Other Reconstruction, Maintenance, Repair or Alteration
☐ 7. Demolition
☐ 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

- ☐ Construction (Building, Heavy
Highway/Sewer/Water)
☐ Tunnel
☐ Residential
☐ Landscape Maintenance
☐ Elevator maintenance
☐ Exterminators, Fumigators
☐ Fire Safety Director, NYC Only

- ☐ Fuel Delivery
☐ Guards, Watchmen
☐ Janitors, Porters, Cleaners,
Elevator Operators
☐ Moving furniture and
equipment
☐ Trash and refuse removal
☐ Window cleaners
☐ Other (Describe)

9. Does this project comply with the Wicks Law involving separate bidding? YES ☐ NO ☐

10. Name and Title of Requester

Signature



NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

**LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE
AWARDED ANY PUBLIC WORK CONTRACT**

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: <https://apps.labor.ny.gov/EDList/searchPage.do>

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 02/02/2024

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	*****5754	0369 CONTRACTORS, LLC		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL	*****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	*****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC		ALL COUNTY SEWER & DRAIN, INC.		7 GREENFIELD DR WARWICK NY 10990	03/25/2022	03/25/2027
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO GARCIA		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL		ANGELO TONDO		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	*****4231	ANKER'S ELECTRIC SERVICE, INC.		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC		AVM CONSTRUCTION CORP		117-72 123RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****8421	B & B DRYWALL, INC		206 WARREN AVE APT 1WHITE PLAINS NY 10603	12/14/2021	12/14/2026
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL		BERNARD BEGLEY		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	NYC	*****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL	*****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	*****5078	BLACK RIVER TREE REMOVAL, LLC		29807 ANDREWS ROAD BLACK RIVER NY 13032	10/17/2023	10/17/2028
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****4083	C.P.D. ENTERPRISES, INC		P.O BOX 281 WALDEN NY 12586	03/03/2020	03/03/2025
DOL	DOL	*****5161	CALADRI DEVELOPMENT CORP.		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	DOL	*****3391	CALI ENTERPRISES, INC.		1223 PARK STREET PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	*****4155	CASA BUILDERS, INC.	FRIEDLANDER CONSTRUCTI ON	64 N PUTT CONNERS ROAD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	AG	*****7247	CENTURY CONCRETE CORP		2375 RAYNOR ST RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC	*****2117	CHARAN ELECTRICAL ENTERPRISES		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028

NYSDOL Bureau of Public Work Debarment List 02/02/2024

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DOL	NYC		CHARLES ZAHRADKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		CRAIG JOHANSEN		10 SOUTH 5TH ST LOCUST VALLEY NY 11560	09/26/2022	09/26/2027
DOL	DOL	*****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	*****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DANIEL ROBERT MCNALLY		7 GREENFIELD DRIVE WARWICK NY 10990	03/25/2022	03/25/2027
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DAVID FRIEDLANDER		64 NORTH PUTT CORNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DINA TAYLOR		64 N PUTT CONNERS RD NEW PALTZ NY 12561	05/10/2023	05/10/2028
DOL	DOL	*****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	AG		EDWIN HUTZLER		23 NORTH HOWELLS RD BELLPORT NY 11713	08/04/2021	08/04/2026
DOL	DA		EDWIN HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	NYC	*****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL		EUGENIUSZ "GINO" KUCHAR		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	NYC	*****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL	*****2998	G.E.M. AMERICAN CONSTRUCTION CORP.		195 KINGSLAND AVE BROOKLYN NY 11222	12/22/2023	12/22/2028
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	NYC		GAYATRI MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DA		GIOVANNA TRAVALJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DA	*****0213	GORILLA CONTRACTING GROUP, LLC		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	DOL		HERBERT CLEMEN		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
DOL	DOL	*****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.M.J CONSTRUCTION		151 OSTRANDER AVENUE SYRACUSE NY 13205	11/21/2022	11/21/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET	11/07/2023	11/07/2028

NYSDOL Bureau of Public Work Debarment List 02/02/2024

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DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON CONSTRUCTION		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R. NELSON, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	12/12/2022	12/12/2027
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		J.R.N COMPANIES, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	*****1147	J.R.N. CONSTRUCTION, LLC		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****7993	JBS DIRT, INC.		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****2435	JEFFEL D. JOHNSON	JMJ7 AND SON	5553 CAIRNSTRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JEFFEL JOHNSON ELITE CARPENTER REMODEL AND CONSTRUCTION		C2 EVERGREEN CIRCLE LIVERPOOL NY 13090	11/21/2022	11/21/2027
DOL	DOL	*****2435	JEFFREY M. JOHNSON	JMJ7 AND SON	5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		JIM PLAUGHER		17613 SANTE FE LINE ROAD WAYNEFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		JMJ7 & SON CONSTRUCTION, LLC		5553 CAIRNS TRAIL LIVERPOOL NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 AND SONS CONTRACTORS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS		7014 13TH AVENUE BROOKLYN NY 11228	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS AND SONS		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JMJ7 CONTRACTORS, LLC		5553 CAIRNS TRAIL CLAY NY 13041	11/21/2022	11/21/2027
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		JOHN MARKOVIC		47 MANDON TERRACE HAWTHORN NJ 07506	03/29/2021	03/29/2026
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	DOL		JOSEPH K. SALERNO		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL		JOSEPH K. SALERNO II		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027

NYSDOL Bureau of Public Work Debarment List 02/02/2024

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DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		JRN CONSTRUCTION CO, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL	*****1147	JRN CONSTRUCTION, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		JRN PAVING, LLC		531 THIRD STREET ALBANY NY 12206	11/07/2023	11/07/2028
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KEAN INDUSTRIES, LLC		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL	*****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		KMA GROUP II, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL	*****1833	KMA GROUP INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KMA INSULATION, INC.		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028
DOL	DOL		KRIN HEINEMANN		2345 ROUTE 52, SUITE 2N HOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	NYC		KULWANT S. DEOL		9-11 40TH AVENUE LONG ISLAND CITY NY 11101	09/26/2023	09/26/2028
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	10/25/2022	10/25/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	12/22/2022	12/22/2027
DOL	DOL		LEROY E. NELSON JR		531 THIRD ST ALBANY NY 12206	11/07/2023	11/07/2028
DOL	AG	*****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL	*****2196	MAINSTREAM SPECIALTIES, INC.		11 OLD TOWN RD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL	*****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024

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DOL	NYC	*****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	*****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	10/25/2022	10/25/2027
DOL	DOL	*****1320	MJC MASON CONTRACTING, INC.		42 FOWLER AVENUE CORTLAND MANOR NY 10567	01/24/2023	01/24/2028
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NAMOW, INC.		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DOL	*****7790	NATIONAL BUILDING & RESTORATION CORP		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	DOL	*****1797	NATIONAL CONSTRUCTION SERVICES, INC		1010 TILDEN AVE UTICA NY 13501	07/24/2023	07/24/2028
DOL	NYC		NAVIT SINGH		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		NELCO CONTRACTING, LLC		1024 BROADWAY ALBANY NY 12204	11/07/2023	11/07/2028
DOL	DA		NICHOLAS T. ANALITIS		505 MANHATTAN AVE WEST BABYLON NY 11704	10/05/2023	10/05/2028
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	11/15/2022	11/15/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	*****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTION, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	NYC	*****5643	NYC LINE CONTRACTORS, INC.		402 JERICHO TURNPIKE NEW HYDE PARK NY 11040	08/10/2022	08/10/2027
DOL	DOL		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL		PATRICK PENNACCHIO		2345 RT. 52 SUITE 2NHOPEWELL JUNCTION NY 12533	12/18/2023	12/18/2028
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026
DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL		PETER STEVENS		8269 21ST ST BELLEROSE NY 11426	12/22/2022	12/22/2027
DOL	DOL	*****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	*****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	07/11/2022	07/11/2027
DOL	DA	*****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE NORTHPORT NY 11768	10/01/2020	10/01/2025
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	*****7172	RZ & AL INC.		198 RIDGE AVENUE VALLEY STREAM NY 11581	06/06/2022	06/06/2027
DOL	DOL	*****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD ROSELAND NY 11069	03/20/2019	03/20/2024

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DOL	DOL		SAL FRESINA MASONRY CONTRACTORS, INC.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		SAL MASONRY CONTRACTORS, INC.		(SEE COMMENTS) SYRACUSE NY 13202	07/16/2021	07/16/2026
DOL	DOL	*****9874	SALFREE ENTERPRISES INC		P.O BOX 14 2821 GARDNER RD POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		SALVATORE A FRESINA A/K/A SAM FRESINA		107 FACTORY AVE P.O BOX 11070 SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	DOL		SAM FRESINA		107 FACTORY AVE P.O BOX 11070 SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	NYC	*****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	DA	*****0476	SAMCO ELECTRIC CORP.		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	NYC	*****1130	SCANA CONSTRUCTION CORP.		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL	*****2045	SCOTT DUFFIE	DUFFIE'S ELECTRIC, INC.	P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	DOL		SCOTT DUFFIE		P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	NYC	*****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5 NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DR MONROE NY 10950	03/20/2019	03/20/2024
DOL	DA		SILVANO TRAVAJA		3735 9TH ST LONG ISLAND CITY NY 11101	01/05/2023	01/05/2028
DOL	DOL	*****0440	SOLAR GUYS INC.		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	NYC		SOMATIE RAMSUNAHAI		115-46 132ND ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL	*****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC	*****3661	SPANIER BUILDING MAINTENANCE CORP		200 OAK DRIVE SYOSSET NY 11791	03/14/2022	03/14/2027
DOL	DOL		STANADOS KALOGELAS		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	*****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	*****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****9528	STEEL-IT, LLC.		17613 SANTE FE LINE ROAD WAYNESFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		STEFANOS PAPASTEFANOU, JR. A/K/A STEVE PAPASTEFANOU, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL	*****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	DOL	*****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329 HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	*****9150	SURGE INC.		8269 21ST STREET BELLEROSSE NY 11426	12/22/2022	12/22/2027
DOL	DOL		SYED RAZA		198 RIDGE AVENUE NY 11581	06/06/2022	06/06/2027
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	*****9733	TERSAL CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070 SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSAL CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14 POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSAL DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATION	2610 SOUTH SALINA ST SUITE 14 SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		TIMOTHY PERCY		29807 ANDREWS ROAD BLACK RIVER NY 13612	10/17/2023	10/17/2028

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DOL	DA	*****1050	TRI STATE CONSTRUCTION OF NY CORP.		50-39 175TH PLACE FRESH MEADOWS NY 11365	03/28/2022	03/28/2027
DOL	DA	*****4106	TRIPLE H CONCRETE CORP		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****8210	UPSTATE CONCRETE & MASONRY CONTRACTING CO INC		449 WEST MOMBSHA ROAD MONROE NY 10950	06/06/2022	06/06/2027
DOL	DOL	*****6418	VALHALLA CONSTRUCTION, LLC.		796 PHEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	*****2426	VICKRAM MANGRU	VICK CONSTRUCTI ON	21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	NYC		VICKRAM MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	*****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL	*****8266	WILLIAM CHRIS MCCLENDON	MCCLENDON ASPHALT PAVING	1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
DOL	DOL		WILLIAM CHRIS MCCLENDON		1646 FALLS STREET NIAGARA FALLS NY 14303	05/01/2023	05/01/2028
DOL	DOL		WILLIAM G. PROERFRIEDT		85 SPRUCEWOOD ROAD WEST BABYLON NY 11704	01/19/2021	01/19/2026
DOL	DOL	*****5924	WILLIAM G. PROPHY, LLC	WGP CONTRACTIN G, INC.	54 PENTAQUIT AVE BAYSHORE NY 11706	01/19/2021	01/19/2026
DOL	DOL		XENOFON EFTHIMIADIS		29-10 38TH AVENUE LONG ISLAND CITY NY 11101	10/11/2023	10/11/2028

TECHNICAL SPECIFICATIONS

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
Division of Engineering



NEW YORK DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

TECHNICAL SPECIFICATIONS

JACKSON AVENUE PUMPING STATION REHABILITATION
BRONX VALLEY SANITARY SEWER DISTRICT
TOWN OF GREENBURGH, NEW YORK

Contract No. 22-510



Environmental Design & Research,

Landscape Architecture, Engineering
& Environmental Services, D.P.C.

217 Montgomery Street, Suite 1100
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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Project - Work covered by Contract Documents.
- B. Limits of work area.
- C. Construction permits and easements.
- D. Work sequence.

1.02. PROJECT - WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of this contract comprises the Project for rehabilitation of the Jackson Avenue Pump Station, including but not limited to, miscellaneous demolition, new electrical and instrumentation equipment, new heating and ventilating, major mechanical equipment replacement, and flood mitigation at each station.
- B. Perform Work under a lump sum and unit price contract with Owner.
- C. Work of this contract is identified on the Drawings and in the Bid Item Description pages of Section 01026.
- D. Work not specifically identified on the Drawings or in the Bid Item Description pages, but required in the Contract Documents, shall be performed as specified.

1.03. LIMITS OF WORK AREA

- A. Confine construction operations within the Contract Limits shown on the Drawings. Storage of equipment and materials, or erection and use of sheds outside of the Contract Limits, if such areas are the property of Owner, shall be used only with Owner's approval. Such storage or temporary structures, even within the Contract Limits, shall be confined to Owner's property and shall not be placed on properties designated as easements or rights-of-way unless otherwise shown on the Drawings.

1.04. CONSTRUCTION PERMITS AND EASEMENTS

- A. The Contractor shall obtain and pay for necessary construction permits from those authorities or agencies having jurisdiction over land areas, utilities or structures which are located within the Contract Limits and which will be occupied, encountered, used, or temporarily interrupted by Contractor's operations.

- B. When construction permits are accompanied by regulations or requirements issued by a particular authority or agency, it shall be Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this project. Any costs associated with additional field supervision by authorities or agencies shall be the Contractor's responsibility.
- C. Keep an approved set of permitted construction plans on site at all times.
- D. Permanent and temporary easements or rights-of-way across private property, which are shown or defined as work areas within the Contract Limits, will be obtained by Owner. Where Contractor's work requires his entry into easement areas to conduct the work, Owner will provide information on such easements and means of access thereto.

1.05. WORK SEQUENCE

- A. Construct work to accommodate Owner's occupancy requirements during the construction period. Coordinate construction schedule and operations with Engineer. Exact sequence of construction shall be determined by the Contractor subject to the following requirements:
 - 1. Rehabilitation of the pump stations duration of work shall be as follows:
 - a. Jackson Avenue Pump Station - 820 days.
 - 2. Contractor shall provide verification to Owner and Engineer that all equipment has been purchased and delivered to the site or stored in an insured facility prior to the pump station being taken out of service.
 - 3. Contractor shall provide the services of a New York State licensed surveyor to survey each site prior to beginning of site construction.
 - 4. The existing pump stations shall be maintained in continuous operation during construction and until new equipment is completed, tested, and ready for operation subject to the following requirements:
 - a. Contractor shall mark property lines of pump station and easements prior to starting any work.
 - b. Coordinate temporary isolation of existing pump station components with Owner and Engineer.
 - c. Contractor shall have on hand all materials, labor, tools, and equipment necessary to accomplish work on process systems or components to be interrupted before temporary isolation of these components begins.
 - d. Begin work on temporarily isolated pump station immediately after isolation and expedite work so that components can be returned to service as soon as possible.

- e. Contractor shall construct or provide secure temporary enclosures to protect existing equipment and bypass pumping equipment. Existing mechanical and electrical systems (pumping, controls, heating and ventilating, treatment, emergency power, etc.) must be kept in service until bypass pumping begins. Temporary enclosures must prevent access by unauthorized personnel.
 - f. Contractor shall provide temporary connections to any electrically powered equipment and critical control devices necessary to assure continued operation during the alterations of existing components.
 - g. Contractor shall provide a complete bypass pumping system, including standby pumps, backup generator system, and alarms with communication to County SCADA system. Contractor shall pay for temporary electric service and connections required for the bypass pumping systems, as well as for all fuel and electric costs for bypass pump system.
 - h. Normal operations of the existing facilities will be performed by the Owner. After facilities are removed from operation, the operation and maintenance of temporary facilities during the bypass pumping operation will be the responsibility of the Contractor.
 - i. Furnish and install temporary bypass pumping equipment including pumps, piping, bulkheads, etc., to maintain the existing operation. The temporary systems shall have the same degree of redundancy as the permanent system.
 - j. Provide temporary electrical service to entire pump station (including the bypass pumping system) during construction of new work. Supplement existing on-site generation facilities with additional temporary capacity as required to support all standard and emergency power requirements throughout the construction period.
- 5. The Contractor shall develop a coordinated schedule which shall include the detailed sequence of construction subject to the requirements of Section 01300.
 - 6. Contractor shall submit a detailed schedule of required system process or pump station shutdowns with estimated durations, anticipated times, and any temporary equipment that may be necessary through the shutdown period. The schedules shall be submitted to the Owner with the overall project schedule for construction, as required by Section 01300. In addition, the Contractor shall meet weekly with the Engineer and Owner to coordinate work sequence issues as described in Section 01300.

1.06. PROJECT REGULATORY REQUIREMENTS

- A. Work in Hazardous and Confined Areas - Contractor is alerted that work will be required within confined spaces and in areas where hazardous gases may be present. Before entering, the Contractor shall investigate the conditions of such spaces and shall determine for himself the proper methods and procedures to be used for working in such spaces safely. The Contractor shall comply with OSHA requirements and any other applicable codes and regulations for confined space entry procedures.

1.07. OWNER OCCUPANCY

- A. The Owner will occupy the site during entire period of construction for the conduct of normal operations.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule the work to accommodate Owner occupancy.

1.08. OPERATION OF EXISTING FACILITIES

- A. Normal operations of the existing facilities will be performed by Owner. Only Owner's staff is allowed to operate existing facilities including equipment, valves, gates, motor controls, etc.
 - 1. Provide Owner and Engineer a minimum of five working days written notice of necessary operation of existing valves, pumps, or equipment to facilitate construction activities.
 - 2. Contractor's activities shall not disrupt Owner's access to operate and maintain existing equipment and facilities. Contractor shall furnish any temporary access required, including ladders, platforms, grating, walkways, and awais, which shall comply with OSHA laws and regulations, for necessary plant operations.
 - 3. Contractor's operations shall not disrupt truck access for the delivery or hauling of materials and suppliers to and from the site.
 - 4. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
 - 5. Schedule the work to accommodate Owner occupancy.

1.09. CONNECTIONS TO EXISTING FACILITIES

- A. Lines, Grades and Elevations – Control lines, bench marks and elevations shall be set by a licensed land surveyor registered in the State of New York employed by the General Contractor. The General Contractor shall verify benchmarks and develop and make all detail surveys needed for construction. Elevations of existing ground or existing structures as shown on the drawings are believed to be reasonably correct but are not guaranteed to be absolutely so, and therefore are presented only as an approximation.
- B. General Contractor shall be responsible for the protection of all benchmarks. Benchmarks damaged by construction activities shall be re-established by a licensed land surveyor registered in the State of New York.
- C. General Contractor shall provide all openings, chases, etc., to fit its own work and that of other Contractors. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by approved Shop Drawings, or shown on manufacturer's erection drawings, shall be provided by General Contractor.

- D. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as an integral part of an opening, the sleeves opening forms or frames shall be furnished by the installer of the pipes, conduits or equipment, but shall be installed by General Contractor. Where hanger inserts, anchor bolts and similar items are to be installed as an integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the same, but shall be installed by General Contractor.
- E. When requested by General Contractor, the installer of the pipes, conduit or equipment, including those Contractors who require openings or chases in slabs and walls for passage of ducts, mounting of equipment, etc., shall furnish all necessary information, instructions and materials to effect accurate installation of the required openings, chases, sleeves, frames, inserts, etc. When such items are secured in position, and just prior to construction of the surrounding slab or wall, the Contractor for whom the items are installed shall ascertain the proper number, locations and settings thereof, and General Contractor shall schedule its operations so as to provide a reasonable opportunity and time interval for such inspection.
- F. After installation of the pipe, conduit or duct is completed, the installer shall be responsible for sealing the annular space around the installed pipe, conduit or duct in accordance Laws and Regulations.
- G. Cost resulting from correction of defective, ill-timed or incorrectly located work, or for subsequent work which becomes necessary because of omitted openings, chases, sleeves, frames, inserts, etc. shall be borne by the Contractor responsible therefore. To this end, no Contractor shall arbitrarily cut, drill, alter, damage or otherwise endanger the work of another Contractor. The nature and extent of any corrective or additional work shall be subject to the approval of the Engineer following consultation with the Contractors involved.
- H. General Contractor shall be responsible for all equipment and housekeeping pads and shall coordinate locations, sizes, and orientation with the installer. Coordination shall include verification of actual required size. Contractor shall not rely solely on the sizes shown on the Drawings.
- I. Temporary connections to existing facilities are covered in Section 01500, Temporary Facilities.

1.10. FACILITY OUTAGES

- A. General
 - 1. Provide a minimum of 30 working days' written notice to Owner and Engineer prior to actual date of scheduled outage.
 - 2. All associated work that can be completed on a system without taking a unit or process out of service shall be completed prior to the outage to minimize down time.
 - 3. Have all required materials, labor, tools, and equipment on site at the required locations and available for use prior to beginning an outage.

4. Provide all temporary facilities required for outages, including bypassing pumping, in accordance with Sections 01500, Temporary Facilities, and 01540, Temporary Bypass Pumping.
 5. Outages cannot be scheduled to begin on a Friday or day before a scheduled holiday.
 6. When temporary shutdowns are planned utilizing tankage with finite storage volumes and/or for limited timeframes, backup bypass pumping systems shall be on site and immediately available for use during shutdowns in case facilities cannot be brought back on-line within the required time limits.
 7. Begin work on temporarily isolated facilities immediately after isolation and expedite.
 8. During scheduled outages, complete all associated work within time frames and constraints identified in Contract Documents and the approved Continuity of Service Plan, including testing and startup.
 9. The Contractor shall be responsible for taking existing facilities off-line, draining and cleaning existing tanks, and removing liquid and solids from existing tanks, wet wells, and other water holding structures as required for new work. Owner will designate locations on Site for liquid and solids removed from the existing facilities to be pumped and/or hauled by Contractor. Contractor is responsible for final washdown and cleaning of existing facilities to the degree required to perform associated work.
- B. Scheduled Outages - Contractor will be allowed to schedule facility outages as identified in Section 01030, Sequence of Work.

1.11. CONTINUITY OF SERVICE PLAN

- A. Submit in accordance with the procedures described in Section 01300, Submittals.
- B. Submit plans for the continuity of utility service and plant operations no later than 30 days prior to each planned interruption.
- C. Plans shall include:
 1. Approximate dates and times of scheduled interruption of service.
 2. Estimated period of outage.
 3. List of existing equipment and facilities that will be affected by the outage.
 4. Proposed sequence of equipment and facility shutdown and startup.
 5. Contractor personnel responsible for overseeing operations.
- D. Plans must be approved by Owner and Engineer prior to proceeding with outage. Revisions to Continuity of Service Plans after initial approval shall be resubmitted to Owner and Engineer at least 14 days prior to scheduled outage and must be approved by Owner and Engineer prior to proceeding with outage.

1.12. REQUESTS TO WORK OUTSIDE OF NORMAL WORKING HOURS

- A. Submit requests to work outside normal working hours at least one week in advance. Requests to work outside normal working hours must be approved in advance by Owner and Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01019

CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Cash allowances.
- B. Schedule of Values.
- C. Application for Payment.
- D. Change procedures.
- E. Alternates.

1.02. DEFINITIONS

- A. Mobilization - Mobilization includes, but is not limited to, performance of preparatory construction operations, including the movement of personnel and equipment to the project site; application, fee payment, and acquisition of all required permits (i.e., erosion and sediment control plans, temporary and permanent building and trade permits, utility connections, etc.); and the establishment of Engineer's and Contractor's offices, buildings, and other facilities required at the site in order to begin work on a substantial phase of the contract. The cost of insurance and bonds.

1.03. MISCELLANEOUS ADDITIONAL WORK

- A. A MAW line item is included with a stipulated sum in the Contractor's bid and on the Schedule of Values. Refer to Section 14 of the Information for Bidders for MAW requirements.

1.04. SCHEDULE OF VALUES

- A. See the Information for Bidders Section 20 for additional requirements.
- B. Submit typed schedule on Contractor's standard form or electronic media printout.
- C. Submit Schedule of Values in duplicate within 10 days after date of Owner-Contractor Agreement.
- D. Format - Utilize Schedule of Bid Items in Bid Proposal. Show cost breakdown for each lump sum item. Cost breakdown to include separate costs for labor, materials, and startup.
- E. Include the amount of MAW specified in Section 14 of the Information for Bidders.
- F. Include within each line item, a direct proportional amount of Contractor's overhead and profit.

- G. Revise schedule to list approved change orders, with each Application For Payment.

1.05. APPLICATIONS FOR PAYMENT

- A. Submit Applications for Payment in accordance with the Information for Bidders and General Clauses sections of the documents.
- B. Content and Format - Approved Schedule of Values will be used to list items in Application for Payment. Certification by Contractor must accompany each application.
- C. Payment Period - Monthly.
- D. Attach required documents and Contractor's back-up data, including updated schedule and all invoices for stored materials.
- E. Contractor must have all record drawings current and up to date prior to submitting Application for Payment.

1.06. CHANGE PROCEDURES

- A. Change procedures are outlined in the Information for Bidders and General Clauses section of the contract documents.
- B. Supplementing the Information for Bidders and General and Special Clauses, Engineer may issue a Proposal Request or Notice of Change which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a proposal to perform the indicated work indicating a proposed adjustment in Contract Price and Contract Times within 30 days.
- C. Contractor may propose changes by submitting a request for change to Engineer, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600, Materials and Equipment.
- D. Execution of Change Orders - Engineer will issue Change Orders for signatures of parties in the following order: Engineer, Contractor, Owner.
- E. The Engineer will advise of minor changes in the work not involving an adjustment to Contract Price or Contract Times by issuing supplemental instructions in a Field Order.
- F. Lump Sum/Price Modification - Based on Proposal Request or Notice of Change and Contractor's fixed or estimated price quotation.

- G. Unit Price Modification - For pre-determined unit prices and quantities, the modification will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not predetermined, execute Work under a Work Change Directive. Changes in Contract Price or Contract Time will be computed as specified in the General Clauses and the Information for Bidders.
- H. Time and Material Modifications - Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Engineer will determine the change allowable in Contract Price and Contract Time as provided in the Contract Documents.
- I. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

- A. Due to space limitations, on-site staging of materials, equipment, and tools shall be in accordance with Article 1.04 of Section 01010.
- B. All materials and equipment necessary for the project shall have been purchased, rented or otherwise legally acquired by Contractor and stored locally before any demolition work commences or any facilities are otherwise removed from service.
- C. Materials and equipment shall be stored off site in a secure location at Contractor's expense. Materials, equipment, tools, etc. shall only be stored on site with coordination with Owner and such storage shall not interfere with Owner's normal operations.
- D. Parking for workers is not available on site. On-street parking arrangements, if permitted, must be made by the Contractor with the Town. Contractor shall comply with all Town requirements.

END OF SECTION

SECTION 01026

LUMP SUM ITEMS (BID ITEM DESCRIPTIONS)

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Price make-up.
- B. Elements of Bid Item description page.
- C. List of Lump Sum Items.
- D. Bid Item Description - attached pages.

1.02. PRICE MAKE-UP

- A. Lump sum prices bid by Contractor are deemed to be full compensation for all required labor, products, tools, equipment, plant, transportation, testing, inspection, services, incidentals, administrative procedures, applicable taxes, permit fees, overhead, profit, and other miscellaneous expenses.

1.03. ELEMENTS OF BID ITEM DESCRIPTION PAGE

- A. Identification of lump sum item, as set forth in the Bid Form.
- B. Brief statement of work involved in the item.
- C. Listing of components of work which make-up the item, including reference to the section(s) covering each component.
- D. Cross-reference to associated work not included in the item.

1.04. LIST OF LUMP SUM ITEMS - CONTRACT NO. 22-510

Bid Item Title	Bid Item Description Number
1. FEMA-Restoration Work	BI-1
2. FEMA-Mitigation Work	BI-2
3. Non-FEMA Work	BI-3
4. Mobilization	BI W699.02001
5. Contract Bonds and Insurance	BI W699.040002
6. Miscellaneous Additional Work	BI-W-800

1.05. BID ITEM DESCRIPTIONS

- A. Bid Item Description pages identified above are attached at the end of this section.

Contract No. 22-510

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

(continued)

BID ITEM DESCRIPTION BI-1

LUMP SUM ITEM

BID ITEM 1

FEMA-RESTORATION

A. DESCRIPTION

Under this item, the Contractor shall provide all labor, materials, and equipment necessary to complete the work below in accordance with the Contract Documents, specified under Divisions 01- Division 46 and as outlined below.

B. WORK INCLUDED
UNDER THIS ITEM

- 1) Furnish and Install Aluminum Hatches
- 2) Excavations, Fill, and Compaction as needed
- 3) Furnish and Install New Pavement
- 4) Furnish and Install New Fence for Generator
- 5) Temporary Bypass Pumping System
- 6) Furnish and Install Extend Bypass Connection Operator
- 7) Furnish and Install Water Heater
- 8) Furnish and Install Backflow Preventer
- 9) Furnish and Install Interior Water Piping
- 10) Furnish and Install 3 Pumps/Motors/Drives/Motor Control Center
- 11) Furnish and Install RVSS Pump Starters
- 12) Furnish and Install Flow Meter
- 13) Furnish and Install Chart Recorder
- 14) Furnish and Install Bubbler System
- 15) Furnish and Install Pressure Transducers for Level Control in Each Wet Well
- 16) Furnish and Install Back-Up High/Low Level Float Switches
- 17) Furnish and Install Concrete Equipment Pads
- 18) Furnish and Install Lighting in Wet Well, Dry Well and Intermediate/ Screenings level.
- 19) Furnish and Install 480- 120/208V Transformer, electrical service meter and main disconnect switch
- 20) Furnish and Install 208V Panelboard
- 21) Furnish and Install Interior Conduit and Wire in Wet Well, Dry Well and Intermediate/ Screenings level.
- 22) Furnish and Install New Programable Logic Controller (PLC) based Control Panel
- 23) Furnish and Install Network Panel
- 24) Furnish and Install Auto-Dialer
- 25) Furnish and Install Wiring Devices
- 26) Furnish and Install HVAC Electric
- 27) Furnish and Install electric unit heaters in the dry well
- 28) Furnish and Install gas detection system
- 29) Include all incidental Work, including but not limited to, conduit, wiring, disconnects, starters, junction boxes, receptacles, pull boxes, concrete bases, and accessories, to perform the items listed above.

- C. ASSOCIATED WORK All other Bid Items
NOT INCLUDED
UNDER THIS ITEM
- D. METHOD OF Payment shall be made of a lump sum Basis in accordance with
PAYMENT Contractor's bid item breakdown. Breakdown shall include, as a
minimum, all the items listed above.

BID ITEM DESCRIPTION BI-2

LUMP SUM ITEM

BID ITEM 2

FEMA-MITIGATION

- A. DESCRIPTION Under this item, the Contractor shall provide all labor, materials, and equipment necessary to complete the work below in accordance with the Contract Documents, specified under Divisions 01- Division 46 and as outlined below.
- B. WORK INCLUDED UNDER THIS ITEM
- 1) Demolition of existing pump station superstructure
 - 2) New pump station Superstructure
 - 3) HVAC Demolition and New Work
 - 4) Furnish and Install Hydro Pneumatic Tank
 - 5) Furnish and Install Sanitary Piping, Floor Drains and Fixtures
 - 6) Furnish and Install Interior Conduit and Wire for new superstructure
 - 7) Electrical Demolition
 - 8) Furnish and Install Underground Utility Service and Ductbanks to Station
 - 9) Furnish and Install Automatic Transfer Switch
 - 10) Furnish and Install Lighting in the Superstructure
 - 11) Temporary Electrical Bypass
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM All other Bid Items
- D. METHOD OF PAYMENT Payment shall be made of a lump sum Basis in accordance with Contractor's bid item breakdown. Breakdown shall include, as a minimum, all the items listed above.

BID ITEM DESCRIPTION BI-3

LUMP SUM ITEM

BID ITEM 3

NON-FEMA

- A. DESCRIPTION Under this item, the Contractor shall provide all labor, materials, and equipment necessary to complete the work below in accordance with the Contract Documents, specified under Divisions 01- Division 46 and as outlined below.
- B. WORK INCLUDED UNDER THIS ITEM
- 1) Furnish and Install all interior influent and effluent piping, valves, and appurtenances.
 - 2) Furnish and Install an additional fourth dry pit submersible pump/motor/drive/motor control center.
 - 3) Furnish and Install Bar Screens
 - 4) Furnish and Install Slide Gates
 - 5) Furnish and Install New Water Well Pump and Associated Piping
 - 6) Furnish and Install Generator Pad
 - 7) Furnish and Install Manual Transfer Switch
 - 8) Furnish and Install Portable Generator Connection
 - 9) Furnish and Install 250kW Generator
 - 10) Include all Work not specifically called out in other Items.
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM All other Bid Items
- D. METHOD OF PAYMENT Payment shall be made of a lump sum Basis in accordance with Contractor's bid item breakdown. Breakdown shall include, as a minimum, all the items listed above.

BID ITEM DESCRIPTION BI-W-699.020001

LUMP SUM ITEM

BID ITEM W-699.020001

MOBILIZATION

- A. DESCRIPTION Under this item, the Contractor shall provide all labor, materials, and equipment necessary to complete the mobilization for the work in accordance with the Contract Documents.
- B. WORK INCLUDED UNDER THIS ITEM Mobilization
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM All other Bid Items
- D. METHOD OF PAYMENT There will be no measurement for Item W699.020001, Mobilization, as this will be paid on a lump sum basis. The cost of mobilization shall not exceed two percent of the Contract Price, excluding this Item, Item W699.040002 Contract Bonds and Insurance and Item W800 Miscellaneous Additional Work.
- E. MEASUREMENT AND LIMITS Payment will be made at the lump sum price bid. This price and payment shall be full compensation for all costs associated with initiating and completing the Contract, exclusive of the cost of materials. Payment shall include compensation for all preliminary and organizational bidding expenses; moving materials and equipment onto the jobsite; project signs; pre-construction surveys; site preparation, including establishing Contractor's Field Sheds and Engineer's Field Office, installation of temporary construction fencing and of siltation and erosion control measures as shown on the drawings; and the general costs associated with establishing the Work on site to assure that it is proceeding in a continuous manner.

BID ITEM DESCRIPTION BI-W-699.040002

LUMP SUM ITEM

BID ITEM W-699.040002

CONTRACT BONDS AND INSURANCE

- A. DESCRIPTION Under this work the Contractor shall provide all necessary bonds, insurance, and prefinancing in accordance with §5 and §7 of the Information For Bidders.
- B. WORK INCLUDED UNDER THIS ITEM Contracts Bonds and Insurance
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM All other Bid Items
- D. METHOD OF PAYMENT There will be no measurement for Item W699.020002, Contract Bonds and Insurance, as this will be paid on a lump sum basis. The cost of Contract Bonds and Insurance shall not exceed three percent of the Contract Price, excluding this Item, Item W699.040001 Mobilization and Item W800 Miscellaneous Additional Work.
- E. MEASUREMENT AND LIMITS Payment will be made at the lump sum price bid. This price and payment shall be full compensation for all costs associated with initiating and completing the Contract. Payment shall include compensation for all Contracts, Bonds and Insurance obtained by the Contractor to perform the Work as indicated in the Contract Documents. The amount bid shall be payable with the first contract payment.

BID ITEM DESCRIPTION BI-W-800

LUMP SUM ITEM

BID ITEM W-800

MISCELLANEOUS ADDITIONAL WORK

- | | | |
|----|---|---|
| A. | <u>DESCRIPTION</u> | Under this item, the Contractor shall provide all labor, materials, and equipment necessary to complete miscellaneous additional work (MAW) |
| B. | <u>WORK INCLUDED
UNDER THIS ITEM</u> | Identified and Authorized Additional Work Not included in the Base Contract |
| C. | <u>ASSOCIATED WORK
NOT INCLUDED
UNDER THIS ITEM</u> | All other Bid Items |
| D. | <u>METHOD OF
PAYMENT</u> | Method of payment shall be in accordance with Section 14 of the Information for Bidders |
| E. | <u>MEASUREMENT
AND LIMITS</u> | Measurements and limits shall be in accordance with Section 14 of the Information for Bidders. |

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Coordination.
- B. Openings, chases, sleeves, inserts, etc.
- C. Field engineering.
- D. Preconstruction conference.
- E. Site mobilization conference.
- F. Progress meetings.
- G. Preinstallation conferences.
- H. Start-up conference.
- I. Electronic communication requirements.

1.02. COORDINATION

- A. Coordinate scheduled work sequences and related operations beforehand with appropriate local, county, or state officials and agencies including affected property owners, when project is to be located in or adjacent to the public right-of-way.
- B. Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas, except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion and for portions of work designated for Owner's occupancy.

- G. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03. OPENINGS, CHASES, SLEEVES, INSERTS, ETC.

- A. The General Contractor shall provide all openings, chases, etc., in his work to fit his own work and that of other prime contractors. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by shop drawings approved by the Engineer, or shown on manufacturer's erection drawings, shall be provided by the General Contractor.
- B. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as an integral part of an opening, the sleeves opening forms or frames shall be furnished by the installer of the pipes, conduits or equipment, but shall be placed by the General Contractor. Where hanger inserts, anchor bolts and similar items are to be installed as an integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the same, but shall be placed by the General Contractor.
- C. When requested by the General Contractor, the installer of the pipes, conduit or equipment, including those Contractors who require openings or chases in slabs and walls for passage of ducts, mounting of equipment, etc., shall furnish all necessary information, instructions and materials to effect accurate installation of the required openings, chases, sleeves, frames, inserts, etc. When such items are secured in position, and just prior to construction of the surrounding slab or wall, the Contractor for whom the items are installed shall ascertain the proper number, locations and settings thereof, and the General Contractor shall schedule his operations so as to provide a reasonable opportunity and time interval for such inspection.
- D. After installation of the pipe, conduit or duct is completed, the installer shall be responsible for sealing the annular space around the installed pipe, conduit or duct in accordance with the requirements of the applicable local, state or national building code.
- E. Any cost resulting from correction of defective, ill-timed or mislocated work, or for subsequent work which becomes necessary because of omitted openings, chases, sleeves, frames, inserts, etc. shall be borne by the Contractor responsible therefore. To this end, no Contractor shall arbitrarily cut, drill, alter, damage or otherwise endanger the work of another Contractor. The nature and extent of any corrective or additional work shall be subject to the approval of the Engineer following consultation with the Contractors involved.

1.04. FIELD ENGINEERING

- A. Control datum for survey work is that provided by Engineer as shown on the Drawings.
- B. Engineer reserves right to inspect or check results of Contractor field engineering services specified herein for conformance with the Contract Documents.

C. Contractor shall provide field engineering services as follows:

1. Employ a land surveyor licensed in the State of New York and acceptable to Engineer.
2. Protect all control and reference points. Accurately replace any such point which is damaged or moved.
3. Provide correct lines, grades, locations and elevations for construction of all project components.
4. Provide correct information for preparation of project record documents.
5. Submit a copy of a registered Site drawing and certificate signed by the land surveyor who provided field engineering services that the locations and elevations of the work are in conformance with the Contract Documents
6. Contractor shall provide all survey data to the Owner at contract closeout.

1.05. PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a conference after the Effective Date of Agreement.

B. Attendance Required - Owner, Engineer and Contractor.

C. Agenda

1. Distribution of extra sets of Contract Documents.
2. Submission of list of subcontractors, list of products, Schedule of Values, and progress schedule.
3. Designation of personnel representing the parties in contract, Owner, and the Engineer.
4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders and contract closeout procedures.
5. Scheduling.
6. Scheduling activities of testing laboratory.
7. Requirements of regulatory agencies.
8. Use of premises by Owner and Contractor.
9. Temporary facilities to be provided by Contractor.
10. Procedures for testing.
11. Procedures for maintaining record documents.

12. Maintenance of vehicular traffic
 13. Periodic cleanup of site.
 14. Notification of utilities' owners.
 15. Electronic communications.
- D. Engineer will record minutes and distribute copies to participants, and to those affected by decisions made.

1.06. SITE MOBILIZATION CONFERENCE

- A. Engineer will schedule a conference at the project site prior to Contractor occupancy.
- B. Attendance Required - Owner, Engineer, each prime Contractor and job superintendent, Contractor, Contractor's superintendent, and major subcontractors.
- C. Agenda
1. Use of premises by Owner and Contractors.
 2. Owner's requirements
 3. Construction facilities and controls provided by Owner.
 4. Temporary utilities provided by Owner.
 5. Survey and building layout.
 6. Security and housekeeping procedures.
 7. Schedules.
 8. Procedures for testing.
 9. Procedures for maintaining record documents.
 10. Requirements for start-up of equipment.
 11. Inspection and acceptance of equipment put into service during construction period.
 12. Requirements of regulatory agencies.
- D. Engineer will record minutes and distribute copies to participants, and to those affected by decisions made.

1.07. PROGRESS MEETINGS

- A. Engineer will schedule and administer meetings throughout progress of the work at maximum monthly intervals.

- B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within five days to participants, and those affected by decisions made.
- C. Attendance Required - Owner, Engineer, job superintendent of each prime Contractor, major subcontractors and suppliers, as appropriate to agenda topics for each meeting.
- D. Agenda
 - 1. Review minutes of previous meetings.
 - 2. Review of work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business relating to work.

1.08. PREINSTALLATION CONFERENCES

- A. When required in individual specification sections, General Contractor shall convene a preinstallation conference at work site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer five days in advance of meeting date.
- D. Prepare agenda, preside at conference, record minutes, and distribute copies within 10 days after conference to participants, with two copies to Engineer.
- E. Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.09. STARTUP CONFERENCE

- A. Engineer will schedule a coordinating conference at least 14 days prior to start-up.
- B. Attendance Required - Owner, Engineer, plant operator, each prime Contractor and job superintendent.
- C. Prerequisites
 - 1. All prerequisites addressed in Section 01660, Testing and Startup, shall be satisfied prior to conference.
 - 2. All shop drawings and required manuals of instruction and maintenance shall be made available by the respective prime Contractors.
- D. Agenda
 - 1. Determine status of equipment.
 - 2. Ascertain presence of materials required to be at site for start-up procedure.
 - 3. Review responsibilities of Owner and respective prime Contractors.
 - 4. Establish startup procedure; develop schedule(s) when appropriate.
 - 5. General coordination of all aspects of startup and initial operation.
 - 6. New York State Department of Environmental Conservation notification.
- E. Engineer will record minutes of meeting and distribute copies within 15 days to participants.

1.10. ELECTRONIC COMMUNICATION REQUIREMENTS

- A. Submit each shop drawing in electronic format in accordance with Section 01300, Submittals.
- B. Request for Information (RFI) – Shall be submitted in electronic format. Information should include, but not be limited to:
 - 1. Document sent from/to information.
 - 2. RFI number.
 - 3. Date created.
 - 4. RFI title/description.
 - 5. Question.
 - 6. Proposed solution.

7. Referenced Drawing.
 8. Referenced specification section.
 9. Attachments - Provide all additional information relative to the RFI such as sketches, drawings, product data, etc. in pdf format.
- C. Submit construction photographs required under Section 01380, Construction Documentation, electronically as attachments in .pdf format.
- D. Submit all letters and memorandums not related to items previously described in this Article in .pdf form via email.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 ALTERATION PROJECT PROCEDURES

- A. Materials - As specified in product Sections; match existing products and work for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to specified condition.
- D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
- E. Where new work abuts or aligns with existing, perform a smooth and even transition.
- F. Patched work to match existing adjacent work in texture and appearance.
- G. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.
- H. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Engineer review.
- I. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- J. Finish surfaces as specified in individual product sections.

3.02 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
 - 6. Seal all new, existing, and unused openings to be watertight under submergence up to the 100-year flood elevation (ABFE 1 percent) plus 30 inches freeboard.
- D. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
- E. Cut rigid materials using masonry saw or core drill.
- F. Restore work watertight with new products in accordance with requirements of Contract Documents.
- G. Fit work watertight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, and floor construction; completely seal all voids watertight under submerged conditions up to the 100-year flood elevation (ABFE 1 percent) plus 30 inches freeboard.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

- J. Identify any hazardous substance or condition exposed during the Work to the Engineer in writing for decision or remedy.
- K. All cutting and patching shall be in accordance with Section 51 of the General Clauses.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Submittal procedures.
- B. Review of submittals.
- C. Schedule of submittals.
- D. Proposed products list.
- E. Shop drawings.
- F. Samples.
- G. Manufacturers' instructions.
- H. Manufacturers' certificates.

1.02. SUBMITTAL PROCEDURES

- A. Transmit each required submittal using Engineer-accepted form.
- B. Number the submittals as follows:
 - 1. First - Specification section number.
 - 2. Submittal number within the specification section.
 - 3. Review cycle number.
 - 4. Title of submittal.

For example:

15073-01-01 - Field lock gaskets for DIP (first review cycle)

15073-01-02 - Field lock gaskets for DIP (second review cycle)

15073-02-01 - Flange pipe and fittings (first review cycle)

15073-02-02 - Flange pipe and fittings (second review cycle)

15073-02-03 - Flange pipe and fittings (third review cycle)

- C. Identify project, Contractor, subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the work and Contract Documents. Stamp shall show the following information:
1. Shop Submittal Number _____
 2. Deviations: None _____; As Listed _____
 3. Reference Specification Number _____
 4. Reference Drawing Number _____
 5. Space Requirement: As Designed _____ Different, As Listed _____
 6. Representation is made to the Owner and Engineer that the Contractor has determined and verified all field measurements and quantities, field construction criteria, materials, catalog numbers and similar data, that he has reviewed and coordinated the information in each shop drawing with the requirements of the work and the Contract Documents, and hereby approves this submittal.
- Contractor _____
- Signature _____
- Date _____
- E. All submittals shall be submitted through electronic submission system. All submittals shall be in PDF format. All files shall be combined into a single bookmarked file for easier review.
- F. Identify deviations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed work.
- G. Identify space requirements which differ from those designed or shown on the Contract Documents.
- H. Revise and resubmit as required, identify all changes made since previous submittal in a cover letter or memorandum
- I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- J. Submittals not requested will not be recognized or processed.
- K. Submittals for which a performance affidavit is required by the individual specification section or Section 01640, Equipment-General, will not be reviewed until an acceptable performance affidavit is included.

- L. Items shall not be fabricated or delivered without fully approved shop drawings.
- M. Ensure no associated work begins until associated shop drawings are fully approved.
- N. Fabrication prior to receiving an “Approved” or “Approved as Corrected – No Resubmittal Required” is at Contractor’s risk.
- O. All submittals shall be in accordance with the General Clauses.

1.03. REVIEW OF SUBMITTALS

- A. Review of submittals will be in accordance with General Conditions Article 6.17.D.
- B. Review Times
 - 1. No less than 21 days shall be allowed for Engineer’s review of submittals and resubmittals unless otherwise specified in the Contract Documents.
 - 2. No less than 28 days shall be allowed for Engineer’s review of Division 17 submittals and all other items including PLC-based control systems.
- C. Review Codes
 - 1. Approved.
 - 2. Approved as Corrected – No Resubmittal Required.
 - 3. Approved as Corrected – Resubmittal Required.
 - 4. Approved as Corrected – Provide Requested Information Only.
 - 5. Revise and Resubmit.
 - 6. Not Approved.
 - 7. For Informational Purposes Only.
- D. Payment will not be made for any items requiring submittals until no further submittals are required for the item

1.04. SCHEDULE OF SUBMITTALS

- A. Submit one electronic copy of the preliminary Schedule of Submittals in accordance with the requirements of the General Clauses.
- B. Revise and resubmit until acceptable to Engineer.

1.05. PROPOSED PRODUCTS LIST

- A. Within 10 days after date indicated in the Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product, and appropriate specification section number.

- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.06. SHOP DRAWINGS

- A. Provide information in accordance with Section 44 of the General Clauses as supplemented herein and as required by individual specification sections.
- B. Shop drawing submittals shall include all descriptive data, performance characteristics, material specifications, spare parts list, drawings, piping diagrams, wiring schematics, and shall be complete and accurate to indicate item-by-item compliance with the Contract Documents.
- C. Shop drawings shall be drawn at scales matching those on the Drawings depicting the same items.
- D. All catalog cuts, manufacturer's specifications, drawings, and verbal descriptions shall be clearly marked to allow identification of the specific products used.
- E. If the submittal deviates from the requirements of the specifications in any way, it shall be clearly marked in the submittal with the justifying reason stated for evaluation by Engineer.
- F. Electrical and control submittals shall include a verbal description of the functions, metering equipment, alarm points, alarm sequences, and any other specific features provided. Control panel submittals shall be in accordance with Section 11990, OEM Control Panels, and Division 17, Instrumentation Specifications.
- G. Electric motor submittals shall be in accordance with Section 15170, Motors.
- H. All electrical equipment submittals shall be in accordance with Division 16, Electrical Specifications.

1.07. SAMPLES

- A. Provide in accordance with the General Clauses, as supplemented herein and as required by individual specification sections.
- B. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- C. Submit samples of finishes from the full range of manufacturers' standard colors in custom colors selected, textures, and patterns for Engineer's selection.
- D. Include identification on each sample, with full project information.
- E. Submit the number or samples specified in individual specification sections; one of which will be retained by Engineer.
- F. Reviewed samples which may be used in the work are indicated in individual specification sections.

1.08. MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, in quantities specified for product data.
- B. When specified in Section 01640, Equipment-General, submit manufacturer's operation and maintenance instructions for equipment supplied for this project. Manuals shall be delivered after shop drawing approval and prior to equipment being started up, and shall be prepared in accordance with Section 01640, Equipment-General.
- C. Identify conflicts between manufacturers' instructions and Contract Documents.

1.09. MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification sections, submit manufacturer's certificate to Engineer for review, in quantities specified for product data.
- B. Indicate that material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.
- D. When specified in Section 01640 or individual specification sections, submit manufacturer's performance affidavit for equipment to be furnished for this project. Affidavits shall be of format and content prescribed in Section 01640, Equipment-General, and shall be included with the shop drawing or product data submittal for the item of equipment to be furnished.
- E. Manufacturer's certificate shall be in accordance with Section 41 of the General Clauses.
- F. Provide certifications that the iron and steel products and/or materials used on this project are in full compliance with American Iron and Steel (AIS) requirements in accordance with the provisions of the Consolidated Appropriations Act. Certifications shall include:
 - 1. Name of manufacturer.
 - 2. Location of manufacturing facility where the product or process took place (not its headquarters).
 - 3. A description of the product or item being delivered.
 - 4. A signature by a manufacturer's responsible party.
- G. Refer to the NYS SRF Bid Packet included as an Exhibit to the Agreement.

1.10. WARRANTY DOCUMENTS

- A. Contractor shall assemble all warranty information for all equipment included in the project in a single bound document. Document shall be tabbed for easy reference by the Owner, with all tabs labeled with the specific equipment in that section (i.e., sewage pumps, mixers, pump control panel, etc.). Three copies of the bound warranty information shall be submitted prior to project closeout.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01310

PROGRESS SCHEDULE

PART 1 GENERAL

1.01. SUMMARY

- A. This specification section covers the development and utilization of the progress schedule. In the event of conflicts or discrepancies with any other provisions of the Contract Documents relating to such, this section shall govern.

1.02. DEFINITIONS

- A. Terms used herein shall be in accordance with the definitions set forth in the Associated General Contractors of America (GCA) publication, "Construction Planning & Scheduling".

1.03. BASIC REQUIREMENTS

- A. Schedule and monitor all work using Critical Path Method (CPM) techniques. Scheduling software shall be Primavera P3 or Microsoft Project. No or equal products will be allowed.
- B. Progress schedule shall be maintained throughout entire contract and shall be used by each Prime Contractor to schedule, plan, organize, and execute the work.
- C. Progress schedule shall:
 - 1. Comply with Contract Times identified in the Agreement.
 - 2. Reflect all mandated sequencing identified in Contract Documents.
 - 3. Include adequate time for Engineer's review of submittals. Under no circumstances will the progress schedule be allowed to include Engineer review times shorter than those prescribed in Section 01300, Submittals, and individual specification sections. The need for resubmittals based on Engineer's review will not entitle Contractor to Contract Time extensions and the progress schedule must include adequate time for resubmittals.
 - 4. Include time required by Contract Documents based on work days lost due to inclement weather.
 - 5. Progress schedule shall include adequate time for testing and startup.
- D. Each activity, except Notice to Proceed, shall have at least one predecessor. Each activity, except final completion, shall have at least one successor.
- E. Construction activities shall have a maximum duration of 20 work days. All durations shall be developed based on definitive manpower and resource planning.

- F. Float is not for the exclusive benefit of the Owner or Contractor and must be used in the best interest of the Project in order to maintain Contract Times. Contractor will not be allowed to sequester float through such strategies as extended activity durations, extensive crew/resource sequencing, etc.

1.04. QUALITY ASSURANCE

- A. Retain the services of an independent CPM scheduler to provide all scheduling services required for this Contract.
- B. Utilize a qualified CPM scheduler to provide all scheduling services required for this contract.
- C. CPM scheduler shall be skilled in the time and cost application of CPM scheduling techniques for multi-disciplined construction projects.
- D. CPM scheduler shall have a minimum of five years' experience in preparing CPM schedules for projects of similar size and complexity.
- E. Engineer reserves the right to reject proposed CPM scheduler if, in the Engineer's opinion, the proposed CPM scheduler does not meet the qualifications specified herein. Engineer will notify Contractor in writing of decision concerning acceptability of proposed CPM scheduler within 14 days of receipt of proposed CPM scheduler qualifications submittal. If Engineer rejects proposed CPM scheduler, resubmit another proposed CPM scheduler within seven days of receipt of Engineer's rejection notice. Such rejection by Engineer does not release Contractor from its obligations under this Contract and will not entitle Contractor to an adjustment of Contract Price and/or Contract Times.

1.05. SUBMITTALS

- A. Submit the following in accordance with the procedures identified in Section 01300, Submittals:
 - 1. CPM scheduler's qualifications within 10 days of Notice of Award including:
 - a. Name and address of proposed CPM scheduler.
 - b. Sufficient information showing proposed CPM scheduler's qualifications including:
 - 1) List of prior construction projects of similar size and complexity.
 - 2) At least one sample network analysis demonstrating complete project planning similar to those required under this contract, prepared by, or under the direction of, the proposed CPM scheduler.
 - 3) Letter from proposed CPM scheduler indicated they have reviewed this Specification section and understand the requirements specified herein.
 - 2. Baseline Schedule (Preliminary 90-Day Progress Schedule)
 - a. Submit one electronic version within 10 days after Notice to Proceed.

- b. Bar chart shall show the following for each activity:
 - 1) Activity ID
 - 2) Activity description
 - 3) Original duration
 - 4) Early start
 - 5) Early finish
 - 6) Late start
 - 7) Late finish
- 3. Detailed Baseline Progress Schedule
 - a. Submit one electronic version within 30 days after acceptance of preliminary progress schedule.
 - b. Bar chart shall clearly identify the critical path and shall provide a tabulated listing of the following for each activity:
 - 1) Activity ID
 - 2) Activity description
 - 3) Original duration
 - 4) Percent complete
 - 5) Remaining duration
 - 6) Early start
 - 7) Early finish
 - 8) Late start
 - 9) Late finish
 - 10) Total float
 - c. No progress payments will be made to Contractor for work completed more than 90 days after Notice to Proceed without an approved baseline progress schedule.

4. Monthly Updates

- a. After acceptance of the detailed baseline progress schedule, submit monthly updates with each Application for Payment. The cutoff date for each monthly update shall be mutually agreed upon by Engineer and Contractor prior to submittal of first monthly update.
- b. Submit one electronic version.
- c. The monthly updates shall include, but not be limited to, tabulated listing of all activities showing the following:
 - 1) Activity ID
 - 2) Activity description
 - 3) Original duration
 - 4) Percent complete
 - 5) Remaining duration
 - 6) Early start or actual start
 - 7) Early finish or actual finish
 - 8) Late start or actual start
 - 9) Late finish or actual finish
 - 10) Total float
- d. Written report including the following:
 - 1) Summary of work accomplished during period.
 - 2) Summary of work to be accomplished during next period.
 - 3) Milestone comparison chart.
 - 4) Critical path analysis.
 - 5) Analysis of work paths with less than 20 days total float.
 - 6) Analysis of time lost or gained during the period.
 - 7) Identification of problem areas.
 - 8) Identification of issues potentially having an adverse impact on the progress schedule.

- B. Engineer's review of Progress Schedule submissions is solely to determine if progress schedule has been prepared in accordance with Contract Documents. Such acceptance will not impose on Engineer and/or Owner responsibility for the progress schedule, sequencing of work, progress of work, nor will it interfere with and/or relieve Contractor full responsibility for the progress schedule, means, methods, and sequence of construction when not specifically dictated by the Contract Documents.
- C. Should Contractor fail to provide submittals, and/or revised submittals, within the time frames prescribed, Contractor will be in default and Owner is not obligated to provide progress payments to Contractor until such time as acceptability of submittals can be verified.

1.06. PROGRESS SCHEDULE ARCHITECTURE

- A. Each activity in the progress schedule shall include:
 - 1. A unique activity identification (ID) number.
 - 2. Activity description.
 - 3. Original duration.
 - 4. Responsibility code assigning activities to Contractor, subcontractors, Engineer, Owner, or other entity.
 - 5. Manpower loading for all construction activities.
- B. Calendars - At a minimum, establish the following calendars:
 - 1. Work day calendar excluding all holidays identified in the Contract Documents.
 - 2. Calendar days for activities with durations based on calendar days.
 - 3. Seasonal calendars covering all seasonally constrained activities.

1.07. BASELINE SCHEDULE (PRELIMINARY 90-DAY PROGRESS SCHEDULE)

- A. Include the following:
 - 1. Detailed activities with associated logic for first 90 days after Notice to Proceed. The preliminary 90-day progress schedule shall include, but not be limited to, mobilization, site work, demolition, key procurement activities (i.e., submissions, approvals, fabrication and delivery) and all other work that will occur in the first 90 days after Notice to Proceed.
 - 2. The balance of the Work shall be shown in a summary log and shall include a summary of activities for construction of each proposed system. Include clear water testing, startup, and post-startup performance tests defined in Section 01660, Testing and Startup.

1.08. DETAILED BASELINE PROGRESS SCHEDULE

- A. Baseline progress schedule shall include no activity progress.
- B. Incorporate 90-day preliminary progress schedule.
- C. Provide sufficient detail to allow use for planning, scheduling, and control all work included in contract. The degree of detail shall be to the satisfaction of the Engineer, and shall account for the following project-specific items:
 - 1. Structural breakdown of project.
 - 2. Required phasing.
 - 3. Milestones.
 - 4. Trades involved.
 - 5. Maintaining operation of existing facilities.
 - 6. Subcontractor work plans.
 - 7. Crew flows and sizes.
 - 8. Access to site and work areas.
 - 9. Identification of coordination between Contractor, subcontractors, and suppliers.
 - 10. Testing and startup.
 - 11. Partial utilization by Owner.
- D. In addition to a breakdown of physical construction activities specified herein, include activities for the following:
 - 1. Submittals.
 - 2. Engineer's review of submittals.
 - 3. Fabrication and delivery of materials and equipment.
 - 4. Finish milestone activity for all Functional Tests associated with a given system (see Section 01660, Testing and Startup, for definition).
 - 5. Separate activities for loading/debugging application software for each system. Amount of time Contractor shall allow for these activities shall be no less than that defined in the Division 17 specifications.
- E. Update to include any revisions to the System Delivery Plan identified in Section 01660, Testing and Startup.
- F. The accepted baseline progress schedule will form the basis of the first monthly update.

1.09. SCHEDULING MEETINGS

- A. Attend monthly meetings with Engineer one week prior to submitting monthly progress schedule updates.
- B. Review proposed activity progress completed during the period, current status of the project, planned work for the next period, and areas where Contractor needs to coordinate with Owner and/or Engineer.

1.10. REVISIONS

- A. Engineer will be the custodian of all official versions of the progress schedule including the 90-day preliminary progress schedule, the baseline progress schedule, and each acceptable subsequent monthly update included with Applications for Payment.
- B. The Owner, Engineer, and Contractor shall have the right to propose revisions to the progress schedule if it is deemed to be in the best interest of the project.
- C. All Owner, Engineer, and Contractor proposed revisions must be submitted to each party no later than seven days prior to the date by which Contractor must submit monthly updates in order for proposed revisions to be considered for that update.
- D. Objections to Proposed Revisions
 - 1. If Owner, Engineer, and/or Contractor object to proposed revisions made by any other party, the objecting party shall provide written notice to each other party within seven days of receipt of proposed revisions, stating objections.
 - 2. Proposed revisions that are not mutually agreeable shall be discussed at the monthly scheduling meetings.
- E. Engineer shall have final say on acceptance or rejection of all proposed progress schedule revisions based solely on requirements of the Contract Documents.
- F. All Engineer-accepted revisions will be incorporated into the next progress schedule update.

1.11. RECOVERY SCHEDULES

- A. If Contractor fails to achieve planned progress, as indicated in the progress schedule, and lack of progress delays the critical path or an intermediate Milestone by more than 10 work days, submit a proposed recovery schedule to Engineer identifying how Contractor will recover lost time.
- B. Failure to submit a recovery schedule and failure to cooperate with the Owner and/or Engineer in the recovery schedule process shall allow Owner the right to order Contractor to increase manpower to recover lost time, without adjustment to the Contract Price. Furthermore, Owner has the right to withhold progress payments until such time as Contractor's progress is brought into compliance with progress schedule.

1.12. DELAYS AND EXTENSIONS OF CONTRACT TIMES

- A. When Contractor believes that Contract Times will be delayed by circumstances outside of its control, Contractor shall include with its notice of Claim, a forward looking Time Impact Analysis (TIA) identifying the anticipated impact to Contract Times. Forward looking TIA shall include the following;
 - 1. A fragnet prepared using the progress schedule submitted with the most recent Application for Payment.
 - 2. A report identifying all new activities included with the fragnet and all proposed logic changes associated with the fragnet.
 - 3. Summary of all requested extensions to Contract Times.
 - 4. Cause of the delay, actions Contractor proposes to take to minimize delays, and actions Contractor proposes for Owner and/or Engineer to minimize delays.
- B. Engineer will review each forward looking TIA after submission. If acceptable to Engineer, Engineer will provide written notice to Owner within 14 days of submission, copying Contractor on correspondence, recommending that the fragnet should be incorporated into the progress schedule and a change order should be issued providing requested extension of Contract Times. Owner will provide written notice to Contractor within 14 days of receipt of Engineer's recommendation, either concurring or denying Engineer's recommendation.
- C. If a forward looking TIA submittal is not acceptable to Engineer, Engineer will provide written notice to Contractor identifying deficiencies with TIA. Contractor will have seven days from receipt of Engineer's written notice to submit a revised TIA addressing deficiencies.
- D. Contract Time extensions will only be considered for events that impact Contract Times as demonstrated by acceptable forward looking TIAs.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01380

CONSTRUCTION DOCUMENTATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Construction photographs.

1.02. DESCRIPTION

- A. Take construction record photographs prior to mobilization and daily during the course of the work.
- B. General Contractor shall provide construction documentation as specified in this section unless otherwise noted.

1.03. CONSTRUCTION PHOTOGRAPHS

- A. Each Prime Contractor shall provide digital construction photographs taken weekly during the major stages on construction listed below and shall be furnished to Engineer and Owner with each Application for Payment.
 - 1. Site before mobilization. A minimum of 200 digital photographs of the pre-construction conditions shall be provided.
 - 2. Progress photos of each work area.
 - 3. Completion of underground facilities prior to backfilling.
 - 4. Completion of site clearing for each structure.
 - 5. Completion of excavations for each structure.
 - 6. Completion of reinforcing and formwork prior to concrete pours.
 - 7. Completion of foundations of each structure.
 - 8. Completion of framing of each structure.
 - 9. Completion of enclosure for each structure.
 - 10. Interior of tanks prior to filling with liquid.
 - 11. Installation of all interior and exposed exterior piping, equipment, and electrical components.
 - 12. Testing of all piping, equipment, and systems.
 - 13. Completion of work at each work area.

14. Completion of site restoration and landscaping.

B. Views and Quantities Required

1. At least 10 photos per week of each work area.
2. Multiple views of each item.

C. Camera used for digital photography shall be a 10.0 megapixel or greater.

D. Electronic Copies

1. Maintain database of pictures for the entire length of the project.
2. Each month, provide two CDs or portable hard drive with electronic versions of all prints taken in the past month (in .jpeg format).
3. Provide two CDs with electronic versions of all prints taken in during the course of the Project (in .jpg format) with final Application for Payment.
4. All electronic copies of photos shall be in .jpg format. All electronic copies of photos shall be arranged on CDs by date and subject. Each .jpg photo file name shall include the subject description and date (example, YYYYMMDD – Description).
5. All electronic copies of the photos shall include the following identification:
 - a. Name and Owner's Contract number.
 - b. Subject and orientation of view (for example, "Aeration Tank Foundation, looking north").
 - c. Date and time of exposure.

1.04. REUSE OF CONSTRUCTION DOCUMENTATION

- A. All construction documentation furnished to Owner shall become the property of the Owner and cannot be copyright or otherwise protected in a manner that prevents free reuse by either the Owner and/or Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. DELIVERY OF PRINTS AND ELECTRONIC COPIES

- A. Preconstruction photos shall accompany the first Application for Payment. This Application for Payment will not be approved without receipt of such materials.

- B. Monthly construction photos (in electronic format) shall accompany each monthly Application for Payment. Monthly Applications for Payment will not be approved without receipt of such materials.
- C. Final construction photos shall accompany the final Application for Payment. This Application for Payment will not be approved without receipt of such materials.
- D. Provide prints at the request of the Owner or Engineer.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Quality assurance and control of installation.
- B. References and standards.
- C. Tolerances.
- D. Field samples.
- E. Mock-up.
- F. Inspection and testing services.
- G. Testing by Contractor.
- H. Shop testing.
- I. Manufacturers' field services and reports.

1.02. QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions.
- C. Verify that field measurements are as indicated on shop drawings and as instructed by the manufacturer.
- D. If manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Comply with specified standards as a minimum quality for the work except when code requirements or equipment manufacturer requires more stringent standards.
- F. Perform work by persons qualified to produce workmanship of specified quality.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion and disfigurement.
- H. Employ skilled and experienced installer to perform cutting and patching.

- I. Submit written request in advance of cutting or altering elements which may affect:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of Owner or separate contractor.
 - J. Execute cutting, fitting, and patching, including excavation and fill, to complete work and to:
 - 1. Fit the several parts together, to integrate with other work.
 - 2. Uncover work to install or correct ill-timed work.
 - 3. Remove and replace defective and non-conforming work.
 - 4. Remove samples of installed work for testing.
 - 5. Provide openings in elements of work for penetrations of mechanical and electrical work.
 - K. Execute work by methods which will avoid damage to other work, and provide proper surfaces to receive patching and finishing.
 - L. Cut rigid materials using masonry saw or core drill.
 - M. Restore work with new products in accordance with requirements of Contract Documents.
 - N. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - O. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
 - P. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
 - Q. Identify any hazardous substance or condition exposed during the work to the Engineer in writing for decision or remedy.
- 1.03. REFERENCES AND STANDARDS
- A. For products and workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified and/or are required by applicable codes.
 - B. Obtain copies of standards where required by individual specification sections.

- C. If specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.04. TOLERANCES

- A. Monitor fabrication and installation tolerance control to produce acceptable work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. If manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.05. FIELD SAMPLES

- A. Furnish field samples at the site as required by individual specification sections.
- B. Acceptable samples represent a quality level for the work.
- C. Where field sample is specified in individual specification sections to be removed, clear area after field sample has been accepted by Engineer.

1.06. MOCK-UP

- A. Tests will be performed under provisions identified in this section and as identified in the individual specification sections.
- B. Assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Where mock-up is specified in individual specification sections to be removed, mock-up shall remain until Engineer provides notice to Contractor that it is acceptable to remove mock-up.
- D. Accepted mock-ups shall be a comparison standard for quality required for the remaining work.

1.07. TESTS AND INSPECTIONS

- A. Contractor shall employ and pay for the services of an independent testing laboratory to perform inspections, tests, and approvals.
- B. Independent testing laboratory will:
 - 1. Perform inspections, tests, and other services specified in the individual specification sections and as required by Engineer and Owner.
 - 2. Perform inspecting, testing, and source quality control which may occur on or off project site, as required by Engineer or Owner.

3. Prepare and submit reports to the Construction Administrator indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Construction Administrator will forward copy of report(s) to Contractor.
- C. Contractor shall:
1. Cooperate with independent firm; furnish samples of materials; furnish design mix, equipment, tools, storage and assistance as requested.
 2. Notify Construction Administrator firm 24 hours prior to expected time for operations requiring services.
 3. Provide weekly look-ahead schedules for testing needs.
 4. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's own use. Independent laboratory must be licensed to operate in the State of New York.
- D. Retesting required because of non-conformance to specified requirements shall be performed, on instructions by the Construction Administrator, by the same independent firm which performed the initial tests and inspections.
- E. Costs for retesting and re-inspection will be deducted from progress payments to Contractor.

1.08. SHOP TESTING

- A. All electrically-driven equipment shall be tested for functionality and performance at the factory.
- B. To the extent practical, equipment shall be assembled, tested and certified at the factory and the working clearances checked to ensure that all parts are properly fitted. At the discretion of the Engineer, this requirement will be waived for equipment that is impractical to test in the factory.
- C. Equipment shall be tested in the shop of the manufacturer in a manner which shall conclusively prove that its characteristics, including any specified pressure, duty, capacity, efficiency, performance, function, or other special requirements, comply fully with the requirements of the Contract Documents and that it will operate in the manner specified. All computations shall be recorded and dated, certified copies of the test results shall be submitted to the Engineer.
- D. Electric motors 10 HP and larger shall be assembled, tested and certified at the factory and the working clearances checked to insure that all parts are properly fitted. The tests shall be in accordance with ANSI/IEEE 112 – Standard Test Procedure for Polyphase Induction Motors and Generators and ANSI/IEEE 115 – Test Procedures for Synchronous Machines standards, including heat run and efficiency tests. All computations shall be recorded and dated, certified copies of the test results shall be submitted to the Engineer.

- E. Shop tests shall confirm that equipment was manufactured within required physical tolerances and that the equipment operates within acceptable limits of the specified performance. Equipment shall be retested following correction of any deficiencies until it is found to be acceptable.
- F. Test measurements shall be taken with properly calibrated instruments. Tests shall be conducted in accordance with recognized standards and procedures.
- G. Additional shop testing requirements may be found in the individual specification sections under which the equipment will be provided.

1.09. MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, material or product suppliers or manufacturers shall provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and demonstration and training as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Certify that equipment has been properly installed and is ready for start-up and testing.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Continuity of Service.
- B. Temporary utilities
- C. Temporary controls.
- D. Construction facilities.

1.02. Continuity of Service

- A. Provide temporary equipment including pumps, piping, valves, bulkheads, electrical equipment and all system components necessary to maintain the existing facilities in service during construction.
- B. Provide temporary power, instrumentation, controls, and alarms necessary to assure continued facilities operation during the alterations of existing facilities components or installation of new equipment.
- C. Maintain emergency backup power supply to all equipment determined by Owner's to be essential to facilities operation. Provide temporary emergency generator and electrical connections, if necessary. Equipment essential to facilities operations includes, but is not limited to, the following:
 - 1. Raw sewage pumping.
- D. Construction may require the closing of various gates and valves to isolate tanks, channels, and equipment. The Owner does not guarantee that the gates and valves will be completely water tight. It is the Contractor's responsibility to take whatever measures are necessary to proceed with construction in the event that valves or gates leak.
- E. Provide temporary access required, including ladders, platforms, grating, walkways, and awais which comply with OSHA laws, for necessary facilities operations.
- F. Provide all line stops and temporary bypass piping and valves required to connect new piping to existing piping, unless otherwise specified.
- G. No extra payment shall be made for any labor, materials, tools, equipment or temporary facilities required during construction. All costs therefore shall be considered to have been included in the Bid.

1.03. TEMPORARY ELECTRICITY

- A. Cost - By Owner; General Contractor shall connect to existing electrical power service. Contractor's power consumption shall not disrupt Owner's need for continuous service.
- B. Owner will pay cost of electricity used by Contractor. Exercise measures to conserve energy.
- C. General Contractor shall provide temporary electric feeder from existing buildings electrical service as necessary to complete the work. Power consumption shall not disrupt Owner's need for continuous service.
- D. General Contractor shall provide power outlets for construction operations, and those of other contractors, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.
- E. General Contractor shall provide main service disconnect and overcurrent protection at convenient location.
- F. Permanent convenience receptacles may not be utilized during construction.
- G. General Contractor shall provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting for Contractor operations and those of other contractors.
 - 1. Provide 20 ampere duplex outlets, single phase circuits for power tools for every 200 sq.ft. of active work area.
 - 2. Provide 20 ampere, single phase branch circuits for lighting.

1.04. TEMPORARY LIGHTING

- A. General Contractor shall provide and maintain lighting for Contractor operations and those of other contractors to achieve:
 - 1. A minimum lighting level of 2 watt/sq.ft. for construction operations.
 - 2. 1 watt/sq.ft. lighting to exterior staging and storage areas after dark for security purposes.
 - 3. 0.25 watt/sq.ft. H.I.D. lighting to interior work areas after dark for security purposes.
- B. General Contractor shall provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required, for Contractor's operations and those of other contractors.
- C. General Contractor shall maintain lighting and provide routine repairs.
- D. Permanent building lighting may be utilized during construction.

1.05. TEMPORARY HEATING

- A. General Contractor shall utilize Owner's existing and new heat facilities, extend and supplement with temporary heat devices as required to maintain specified conditions for Contractor's construction operations and those of the other contractors.
- B. Owner will pay cost of energy used for heating. Exercise measures to conserve energy. General Contractor shall provide temporary, insulated closures of all exterior openings to minimize heating losses.
- C. General Contractor shall maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress and 65 degrees F in plant personnel-occupied areas, unless indicated otherwise in individual specification sections.

1.06. TEMPORARY COOLING

- A. General Contractor shall provide cooling devices and cooling as needed to maintain specified conditions for Contractor's construction operations and those of the other contractors.
- B. Owner will pay cost of energy used for cooling. Exercise measures to conserve energy. General Contractor shall enclose building prior to activating temporary cooling in accordance with the Exterior Enclosures article specified herein.
- C. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated, and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- D. Maintain maximum ambient temperature of 80 degrees F (26 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.

1.07. TEMPORARY VENTILATION

- A. General Contractor shall utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for Contractor's construction operations and those of the other contractors.

1.08. TELECOMMUNICATIONS SERVICE

- A. Contractor shall provide, maintain and pay for telecommunications service to its field office and for Engineer's field representative for the duration of the contract. Telephone services shall be paid for completely by Contractor including all connection fees, monthly fees (phone and internet), local and long distance usage charges, taxes and all other telecommunications services provided under this Contract.
- B. Provide one direct line telephone services to Engineer for the duration of the contract. Telephone equipment shall include a cordless phone with answering machine.

- C. Provide high speed internet service to Engineer's field trailer as follows:
 - 1. Internet service shall include modem, cables, installation, and all other equipment necessary for a complete functioning system.
 - 2. Internet service shall be available for use within two weeks of Contractor's mobilization.
 - 3. Coordinate all maintenance and repairs to the system for the duration of the contract. No components shall be out of service for more than 24 consecutive hours.
- D. Provide one plain paper color printer/copy machine by Canon for the Engineer's field trailer. Provide paper and toner for the duration of the contract. The machine shall have a minimum 100 sheet capacity, be able to print sheet sizes up to 11-inch x 17-inch paper, and include the ability to send documents via fax.
- E. Contractor shall be responsible for servicing the aforementioned equipment. No components shall be out of service for more than 24 consecutive hours.

1.09. CELLULAR PHONE

- A. General Contractor shall provide, maintain, and pay for a smart phone with internet service to be exclusively used by Resident Project Representative for the duration of the Contract. General Contractor shall pay for all costs associated with the use of the cellular phone, including unlimited voice, voice mail, email, text, and data plans with uninterrupted service over the entire project area and surrounding locality.

1.10. TEMPORARY WATER SERVICE

- A. General Contractor shall provide and maintain suitable quality water service required for Contractor's construction operations and those of other contractors. General Contractor shall connect to Owner's existing water source.
- B. Owner will pay cost of water used. Exercise measures to conserve water.
- C. General Contractor shall extend branch piping with outlets located so water is available by hoses with threaded connections for use by all Contractors. General Contractor shall provide temporary pipe insulation to prevent freezing.
- D. Each Contractor shall provide sufficient potable quality drinking water for its employees at the project site.

1.11. TEMPORARY SANITARY FACILITIES

- A. General Contractor shall provide and maintain required sanitary facilities and enclosures for use by all persons employed at the site. Provide at time of mobilization. Existing facilities shall not be used.
- B. General Contractor shall remove facilities from site at end of construction.

1.12. BARRIERS

- A. General Contractor shall provide barriers to prevent unauthorized entry to construction areas to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition. Maintain Owner access to all areas of plant in continuous operation.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plant life designated to remain. Replace damaged plant life.
- D. Protect vehicles, stored materials, site, and structures from damage.
- E. Supplement barriers with suitable signs, railings and night lights, as necessary to conform with governing authorities and regulations.

1.13. WATER CONTROL

- A. General Contractor shall grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect Site from soil erosion.

1.14. EXTERIOR ENCLOSURES

- A. General Contractor shall provide temporary insulated weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.15. INTERIOR ENCLOSURES

- A. General Contractor shall provide temporary partitions and ceilings as required to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction - Framing and plywood sheet materials with closed joints and sealed edges at intersections with existing surfaces; insulated STC rating of 35]in accordance with ASTM E90.
- C. Paint surfaces exposed to view from Owner-occupied areas.

1.16. PROTECTION OF INSTALLED WORK

- A. Each Contractor shall protect its installed work from damage and deterioration due to construction activities, traffic, birds, pests, vermin, wildlife, pets, pedestrians, visitors, vandals, dust, vapors, floods, precipitation, driving rain, wind, snow storms, melting temperatures, or freezing temperatures; provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic over landscaped areas. Provide adequate barriers, directional signs, and/or guards, if necessary to provide adequate protection of landscaped areas.
- G. Owner reserves right to order that additional protective measures be taken beyond those proposed by Contractors, to safeguard the existing facilities and Work at no additional cost to Owner.

1.17. SECURITY

- A. General Contractor shall provide security and facilities to protect its work, and that of other contractors including existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Each Contractor shall maintain a daily sign-in sheet for his workers and subcontractors.

1.18. ACCESS ROADS

- A. All Contractors shall utilize existing on-site roads for project access and construction traffic. Coordinate with Owner and Engineer.
 - 1. Provide detours as necessary for unimpeded traffic flow.
 - 2. Roads shall be free for use by all personnel involved in project and be adequate for transportation of persons, materials, equipment, and products to construction area.
 - 3. Maintain roads in serviceable condition, free of obstructions, potholes, ponded water, debris, and accumulated snow and ice, until completion of project.

1.19. PARKING

- A. General Contractor shall construct temporary gravel surface parking areas to accommodate all construction personnel involved with the project.

- B. When site space is not adequate, General Contractor shall provide additional off-site parking.

1.20. MAINTENANCE OF TRAFFIC

- A. General Contractor shall maintain and regulate traffic within Contract Limits in accordance with applicable state, county, and local regulations.
- B. Conduct operations so as to maintain access for vehicular and pedestrian traffic to and from properties adjoining or adjacent to those streets and roads affected by construction activities, and to subject the public to a minimum of delay and inconvenience.
- C. Erect suitable signs and barricades including warning lights at night, to alert traveling public. Provide watchmen and flagmen as necessary to maintain and regulate traffic.
- D. Provide flagmen, to direct and regulate traffic on heavily traveled thoroughfares on which traffic will be subject to delays or detours caused by construction operations.
- E. Plan operations so that access to any dwelling, building or hospital is assured in case of fire or other emergency. Review with and obtain approval from local fire and police departments and school districts (for buses) regarding anticipated detours and obstructions to traffic flow which could hinder passage of fire apparatus, ambulance or otherwise.
- F. Not more than one block nor more than one cross-street intersection may be torn up, obstructed or closed to travel at one time without permission of the Owner. If the project involves pipe laying operations, and if more than one pipe laying crew is operating at separate locations in the work area, this requirement shall apply to each crew's operation, but shall be consistent with traffic maintenance procedures required by the Owner.
- G. When the normal route of vehicular access to any property must be temporarily obstructed, notify the affected property owner at least 24 hours in advance of intended operations at the location. The route shall subsequently be re-opened not later than one day following the start of construction at that location, unless special arrangements have been made with property owner. Vehicular access to hospitals, schools, fire and police departments must be provided at all times.
- H. General Contractor shall comply with requirements of Department of Transportation agencies having jurisdiction:
 - 1. Where the work is in or encroaches upon a public right-of-way, such as a road, Contractor shall perform the work in strict compliance with the rules, regulations, requirements, and staff decisions of all applicable Department of Transportation agencies having jurisdiction.
 - 2. Strict adherence to the latest edition of the Work Area Protection Manual and Land Use Permit Regulations (or equivalent documents in the Project area) is required.
 - 3. Frequent inspections of work conditions by staff of agencies having jurisdiction should be anticipated by Contractor.

4. Compliance with the requirements of the agencies having jurisdiction shall be the sole responsibility of the Contractor with the determination of compliance at the sole discretion of the staff of agencies having jurisdiction.
5. Failure to comply with the requirements of agencies having jurisdiction will result in full-time or part-time inspection by the staff of the agencies having jurisdiction.
6. Charges for these inspections will be based on the policies of the agencies having jurisdiction as determined solely by the agencies having jurisdiction.
7. Whenever charges are incurred, these charges will be invoiced to the Owner. The Owner will invoice the Contractor for these charges plus a 20 percent administrative fee. The Contractor shall pay these invoices no less frequently than monthly.
8. Contractor shall not be granted Substantial Completion until all of these invoices are paid by the Contractor to the Owner.
9. No additional claim for increased cost or extension of time shall be allowed in the event these requirements are imposed by agencies having jurisdiction.

1.21. PROGRESS CLEANING

- A. Each Contractor shall maintain areas free of waste materials, debris, and rubbish. Maintain site and structures in a clean and orderly condition, as follows:
 1. Remove debris and rubbish from pipe chases, plenums, attics, crawlspaces, and other closed or remote spaces, prior to enclosing the space.
 2. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
 3. Collect and remove waste materials, debris, and rubbish from site weekly and dispose offsite.
- B. Each Contractor shall store unused tools and equipment at its yard or base of operations.

1.22. POLLUTION CONTROLS

- A. Dust Control
 1. Each Contractor shall execute work by methods to minimize raising dust from construction operations.
 2. Provide positive means to prevent airborne dust from dispersing into atmosphere.
 3. Wash down disturbed areas daily.
 4. Implement best management practices in accordance with requirements of agencies have jurisdiction over dust control.

- B. Erosion and sediment control shall be provided in accordance with the Contract Documents, the project Stormwater Pollution Prevention Plan, and the requirements of governing regulatory agencies.
 - 1. General Contractor shall plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas.
 - 2. Minimize amount of bare soil exposed at one time.
 - 3. Provide temporary measures such as berms, dikes, and drains, to regulate water flow and prevent soil erosion.
 - 4. Periodically inspect earthwork in disturbed areas to detect evidence of erosion and sedimentation; promptly apply corrective measures.
 - 5. Implement best management practices in accordance with requirements of agencies having jurisdiction over erosion and sediment control.
- C. Noise Control
 - 1. All construction equipment and tools exhibiting potential noise nuisance shall be provided with noise muffling devices.
 - 2. Confine use of such equipment and tools between the hours of 7 a.m. and 5 p.m.
 - 3. Implement best management practices in accordance with requirements of agencies having jurisdiction over noise control.
- D. Pollutants Control - Provide methods, means and facilities to prevent contamination of soil, water and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.23. PROJECT IDENTIFICATION

- A. General Contractor shall provide 8-foot wide by 6-foot high project sign of exterior grade plywood and wood frame construction, painted, die cut vinyl, self-adhesive letters and self-adhesive corporate logo, to Engineer's design and colors.
- B. List title of project, names of Owner, Engineer, professional subconsultants, Contractor, and major subcontractors.
- C. Erect on site at location established by Engineer.
- D. General Contractor shall provide additional project signs if required by funding and regulatory agencies.
- E. No other signs are allowed without Owner permission except those required by law or specified elsewhere in the Contract Documents.

1.24. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Respective Contractors responsible for temporary utilities, facilities, and controls shall remove temporary utilities, equipment, facilities, controls, materials, prior to Substantial Completion.
- B. Remove temporary barriers, enclosures, etc. in concert with completion of those segments of work which no longer require such measures.
- C. Remove temporary underground installations to a minimum depth of 2 feet.
- D. Clean and repair damage caused by installation or use of temporary work.
- E. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.25. CONTRACTOR'S FIELD OFFICE

- A. Provide weathertight field office with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing rack, drawing display table, and filing cabinets for Contractor's use.

1.26. ENGINEER'S FIELD OFFICE

- A. Provide and maintain a weathertight field office for exclusive use of Engineer with lighting, electrical outlets (one for each wall), permanent heating, cooling and ventilating equipment, and equipped with the following sturdy furniture:
 - 1. Two standard size desks, 3-foot x 5-foot, each with rolling padded desk chair, and at least three drawers.
 - 2. One Drafting Table – 39 inches x 72 inches x 36 inches high with one equipment drawer.
 - 3. One drafting table stool.
 - 4. Two 3-foot x 6-foot folding table.
 - 5. One plan rack to hold a minimum of six sets of project drawings.
 - 6. Three standard four-drawer legal-size metal filing cabinets with locks and keys.
 - 7. Ten folding chairs.
 - 8. One 8-foot x 30-inch folding leg table.
 - 9. One fire extinguisher.
 - 10. Two wastebaskets.
 - 11. One coat rack.

12. Two tackboards, 36 inches x 30 inches.
 13. One heavy-duty, metal three-hole punch.
 14. One water cooler (provide refills as required throughout the project).
 15. One refrigerator, minimum of 4.0 cubic feet, with freezer minimum of 1.0 cubic feet.
 16. One microwave oven, 0.8 cubic feet, 800 watt minimum.
 17. Heavy-duty wall shelving 20 sq. ft. minimum.
 18. One digital camera with 10.0 megapixels or greater.
- B. Engineer's field office shall be ready for occupancy within 10 days following Notice to Proceed. Mobile field office trailer is acceptable if it contains the required facilities. At a minimum, provide the following:
1. Minimum Field Office Size - 440 square feet.
 2. Equip windows and doors with locking devices to prevent unauthorized entry. Provide three sets of keys to Owner.
 3. Provide horizontal mini-blinds for all windows.
 4. Hot and cold water connected to the facilities potable water system.
 5. Bathroom with elongated toilet and sink with hot and cold water.
 6. Telecommunications services identified in this section.
- C. Laptop computer workstation with Microsoft Office Professional 2010. Minimum diagonal screen size shall be 15.6-inches. Provide minimum 8 GB memory and 128 GB SSD storage.
- D. Install 24-inch x 30-inch sign on outside wall as determined by Engineer. Paint sign white with blue, 3-inch high lettering, neatly arranged, to read: "Field Office, EDR. and 315-471-0688."
- E. Arrange for offices to be cleaned at least once every week. Restroom supplies shall be provided for the duration of the contract.
- F. Location of the field office shall be coordinated with the Engineer and Owner, and shall not be disturbed, moved or interrupted without the Engineer's approval.
- G. On completion of the contract, remove the field office from the site.

PART 2 PRODUCTS

Not used.

Contract No. 22-510

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01540

TEMPORARY BYPASS PUMPING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. General Contractor shall furnish, install, test, and operate temporary bypass pumping systems and bypass piping systems where necessary to complete the work.
 - 1. Bypass Pumping System - The bypass pumping system shall consist of all equipment, piping, valves, meters, plugs, power supplies, and other appurtenances required to divert sewer flows. The bypass pumping system shall be comprised of primary and secondary pumping setups in addition to all bypass piping necessary to complete the work. The work shall be scheduled in such a manner that allows the completion of the work in a time frame that minimizes the duration of bypass pumping.
 - 2. Bypass Piping - The bypass piping shall consist of the piping, valves, supports, and other appurtenances including, but not limited to, air relief valves and dewatering connections. The bypass piping includes both the suction and discharge piping for each primary and backup bypass setup. Separate suction pipes shall be provided for each bypass pump.
- B. The Engineer's and Owner's receipt of the Flow Bypass Plan does not relieve Contractor of responsibility for means, methods, and sequences of construction; requirement to pump and transport peak flows; and safety.

1.02. PERFORMANCE AND DESIGN REQUIREMENTS

- A. It is essential to the operation of the existing sewage force main system from the Jackson Avenue Pump Station to the forcemain that there be no interruption in the flow of sewage throughout the duration of the project. The Contractor shall provide, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment, conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with work; carry it past this work; and return it to the existing treatment system downstream of the work.
- B. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
- C. The Contractor shall incorporate provisions to remove water from the primary bypass pumping system to protect against freezing and damage. During cold weather operations, diesel generators shall utilize trickle chargers and block heaters, and critical priming piping shall be protected with heat tracing. Contractor shall provide cold weather mix diesel fuel during cold weather operations.

1.03. BYPASS PUMPING SYSTEM REQUIREMENTS

- A. Design Responsibility and Vendor Qualifications- The design, installation and operation of temporarybypass pumping systems shall be the Contractor's responsibility and shall be designed by an Engineer licensed in NY State. Contractor shall employ the services of a Professional Engineer and vendor who can demonstrate to the Engineer that they specialize in the design and operation of temporary bypass systems. The Professional Engineer and vendor shall provide at least five references of projects of similar size and complexity as this project performed within the past five years. The temporary pumping system shall be in accordance with laws and regulations, including local noise and light ordinances.
- B. Fuel Supply- Provide fuel supply for 48 hours of operation on site for diesel-powered systems, stored in accordance with laws and regulations. Assume responsibility for all spills and regulatory fines due to failure of the temporary pumping system.
- C. System Capacity- Jackson Avenue- Designed to pump peak influent flow of 1900 gpm. Average daily flow is approximately 296 gpm.

Primary Setup No.	Location	Average Daily Flow (gpm)	Peak Hour Capacity (gpm)	Peak Hour Total Dynamic Head (feet)	Comments
1	Jackson Avenue Pumping Station	296	1,900	131	<i>Suction Location:</i> Existing Influent Manhole <i>Discharge Location:</i> Existing force main bypass location

- D. Suction Location – Jackson Avenue-The Contractor shall draw suction from the manhole immediately prior to the wet well, located in from of the building.
- E. Discharge Location – Jackson Avenue – Contractor to discharge to existing forcemain through the existing bypass connection as shown on the drawings.
- F. Force Main Lengths- Jackson Avenue pumping station force main

- 1. 14-inch CIP force main pipeline – 3,280 feet

The above lengths are approximate. The Contractor is required to verify lengths through evaluation of existing facilities as-built or construction drawings to be provided by the Owner prior to preparing the bypass pumping system design and submittal of shop drawings.

- G. Elevations

- 1. Forcemain Discharge Manhole Elevation – 241.5
- 2. Ground elevation at pump station - 384

The above elevations are approximate. The Contractor is required to verify elevations prior to preparing the bypass pumping system design and submittal of shop drawings.

- H. Provide variable frequency drives to meet variable flow demands and temporary pumping requirements.
- I. Pumps
 - 1. The pumps and drives shall be rated for continuous duty and shall be capable of pumping the required flow ranges without surging, cavitation, or vibration. Where required pumping rates are not specified coordinate with Engineer to determine required pumping range prior to submitting associated shop drawings. Pumps shall not overload drivers at any point on the pump operating curve. Pumps shall be suitable for use with raw unscreened wastewater and trash consistent with current influent wastewater flow into the treatment plant. Pumps shall be self-contained unit designed for temporary use.
 - 2. Pumps shall either have fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system, or they shall be submersible.
 - 3. The pumps shall be electric, diesel powered, or powered by a diesel-powered generator.
 - a. Existing electrical service at the pump station is 600A, 208V
- J. The system shall include, at a minimum, the following equipment:
 - 1. Suction lift primary pump(s). The primary pump(s) shall be capable of pumping the peak flow, be connected to the bypass piping, be isolated with valves, and be complete with power supplies.
 - 2. One suction lift backup pump with equal capacity of the primary pumps. If multiple primary pumps are utilized, provide a backup pump for each primary pump. Backup pump(s) shall be piped into discharge piping.
 - 3. One suction lift standby pump with equal capacity of the largest primary pump. Standby pump shall be stored at the site or at a site mutually agreed to by Contractor and Owner. If standby pump is placed in operation, an additional standby pump shall be provided within four hours.
 - 4. Dialer equipped to dial at high level alarms and power failure alarm to the Westchester County Department of Environmental Facilities' response system and Contractor's 24-hour emergency number.
 - a. Contractor must use existing pump station dialer to contact County personnel.
 - b. Contractor must also verbally contact the County's Control Center in the event of an alarm.
 - 5. Required variable frequency drives (VFDs), floats, pump control panels, and float switches for pump operations and alarm indication.

- K. Monitoring - Provide a backup pump on site and ready for operation of the same capacity as the largest temporary bypass pump. In addition, one of the following two conditions must be met:
1. The temporary pumping system must be manned continuously (24 hours per day, 7 days per week) during operation by a representative of the Contractor trained and certified by the pump supplier. In the event of a pump failure, the Owner shall be notified within 15 minutes and the temporary backup pump shall be placed into service within 1 hour of the pump failure.
 2. As an alternative to 24/7 manned operation, install, test, and maintain remote telemetry to monitor operation of the temporary pump(s) and the wet well level(s). Notify Owner within 15 minutes of a pump and/or system failure. Report to site within 30 minutes of a pump and/or system failure, and place the temporary backup pump in service within 1 hour of a pump and/or system failure. The telemetry system shall notify up to six individuals in a specific order; the contact phone numbers shall be coordinated with and provided to the Owner.
 3. For temporary pumping system with automatic backup pump operation, report to site within 30 minutes of a pump failure to ensure the automatic backup system is operating properly.
- L. Sound Attenuation - Temporary pumping systems shall be equipped with noise reduction features that limit the noise output to 65 dbA within 50 feet of the equipment or to 60 dbA at the nearest residence property line, whichever is less.
- M. Location of bypass pumping systems shall be coordinated with the Owner and Engineer.
- N. The bypass pumps shall be electric, diesel-driven or powered by a diesel-powered generator. Provide fuel supply for 48 hours of operation on site and stored in accordance with laws and regulations for diesel-powered systems. Assume responsibility for all spills and regulatory fines due to failure of the temporary pumping system.
- O. For electric driven pumps, provide temporary portable generator adjacent to bypass pumps at suction location. Generator shall be capable of powering all pumps necessary to meet peak flow. In addition, Contractor shall provide an additional standby generator in the event the primary generator fails.
- P. See Section 01010, Summary of Work, for facility outage requirements and constraints.
- Q. Provide concrete Jersey barriers in all locations where temporary pumps, piping, and other accessories are located in roadways, driveways, and other vehicle-accessed areas.
- R. Provide security fencing for all temporary pumps where not located within a secured area.
- S. Provide all software development and device configuration required for the system, including but not limited to, the PLC and graphics, alarming, and autodialer.

- T. The Contractor shall incorporate provisions to remove water from the primary bypass pumping system to protect against freezing and damage. During cold weather operations, diesel generators shall utilize block heaters and critical priming piping shall be protected with heat tracing. Contractor shall provide cold weather mix diesel fuel during cold weather operations.

1.04. QUALITY CONTROL

- A. The Contractor will retain the services of a licensed New York State Professional Engineer to design, review the installation, and approve the bypass pumping and piping system. Calculations and review comments will be kept on file for the duration of the contract.
- B. The General Contractor shall employ the services of a vendor who can demonstrate to the Engineer that they specialize in the design and operation of temporary bypass systems..
- C. Vendor shall be Godwin Pumps (Xylem) or Engineer-approved equal.

1.05. BYPASS DISCHARGE PIPING

- A. Provide discharge piping from bypass pump(s) location to connection point on existing force main.
- B. Pump discharge lines shall be valved to allow throttling for flow adjustments.

1.06. SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300, Submittals, as supplemented herein.
- B. Flow Bypass Plan – General Contractor shall submit a specific detailed description of each proposed temporary pumping system at least 60 days prior to intended use. No construction shall begin until all submittals have been reviewed by the Engineer and are determined to be complete and all pumps, piping, and valves are on site ready for installation. The submittal shall include a written description of the plan including, but not limited to, the following:
 - 1. Quantity, capacity, and location of all pumping equipment.
 - 2. Pump performance curves and head capacity curves demonstrating the capability to meet all required flows.
 - 3. Sewer plugging plan (as applicable), including type, location, and emergency release procedures.
 - 4. The size, type, and routing of all suction and discharge piping and associated valves and pipe supports, including the means of connecting the system.
 - 5. Shop drawings for materials of piping, valves, plugs, piping supports, and all accessories,
 - 6. Shop drawings for pumps, motors, and controls.

7. Compliance with permits required by the New York State Department of Environmental Conservation or the Owner.
 8. Plan for sound attenuation for the bypass pumping system.
 9. Cold weather operational plan to protect equipment and pipes from freezing, including provisions to remove water that is trapped in sections at low spots in the discharge line.
 10. Standard and emergency shutdown plan indicating emergency (24-hour) contacts, drain points, draindown time, disinfection, and disassembly.
 11. Schedule for installation and maintenance of bypass pumping lines.
 12. Details for personnel crossings, if necessary.
 13. Plan to limit odors from being generated, including seals at discharge manholes and primary and secondary setup manholes.
 14. Monitoring and alarm system(s) that will provide immediate determination of loss of bypass pumping integrity during operation and provide immediate notifications.
 15. Schedule for routine inspection of bypass pumping lines.
 16. Temporary electrical cabling and system for electric driven pumps.
- C. The Engineer's and Owner's receipt of flow bypass plan does not relieve Contractor of responsibility for means, methods, and sequences of construction, requirement to pump and transport peak flows, and for safety.

1.07. PROJECT RECORDS

- A. The Contractor shall maintain records which indicate the following:
1. Dates of installation and operation of primary and secondary setups.
 2. Maintenance schedules for each pump.
 3. Dates and times of any flow loss from the bypass pumping system.
 4. Dates and times of any backups of flow and Contractor action with corrective actions taken.

1.08. REGULATORY REQUIREMENTS

- A. Conform to regulatory agencies having jurisdiction over the work.
- B. Contractor is responsible for fines levied on Owner by state, federal, and/or other agencies due to spills caused by failure of temporary pumping and piping systems.

1.09. FIELD MEASUREMENTS

- A. Prior to start of construction, verify by field measurements that existing conditions are as shown on Drawings. Notify Engineer of differences.

1.10. COORDINATION

- A. Coordinate field work under provisions of Section 01039, Coordination and Meetings, including maintenance of traffic and emergency 911 service.
- B. Coordinate work with local utility companies (private and municipal) for location of existing utilities and protection thereof.
- C. Coordinate flow bypassing with Owner. The Contractor will be responsible for the removal or moving of snow surrounding the bypass system and piping.

1.11. TEMPORARY PUMPING COORDINATION MEETING

- A. The Contractor shall be responsible for the installation, operation, and removal of all flow bypass facilities and surface restoration in accordance with the approved project schedule.
- B. After Owner and Engineer review and approval of temporary pumping system submittal(s), and at least 14 days prior to intended use, schedule a coordination meeting with the Owner, Engineer, Contractor, and subcontractor or temporary pump supplier, if applicable.
- C. No temporary pumping shall take place until after satisfactory completion of the coordination meeting and all new piping, valves, and pumping equipment for the new pumping station has been delivered to the site.
- D. Work shall be scheduled to minimize the duration of bypass pumping.

PART 2 PRODUCTS

2.01. PUMPS

- A. The pumps and drives shall be rated for continuous duty and shall be capable of pumping the required flow ranges without surging, cavitation, or vibration. Where required pumping rates are not specified, coordinate with Engineer to determine required pumping range prior to submitting associated shop drawings. Pumps shall not overload drivers at any point on the pump operating curve.
- B. Pumps shall be suitable for use with raw unscreened sewage and trash being pumped. Pumps shall be self-contained units designed for temporary use.
- C. Pumps shall be suction lift style with automatic self-priming that do not require the use of foot-valves or vacuum pumps in the priming system.
- D. Provide the necessary start/stop and level controls for each pump.
- E. Provide the necessary motors and VFDs for pump operation.

- F. System shall be as provided by Godwin Pumps, or approved equal.

2.02. BYPASS PIPING

- A. Pipe 12 inches and larger shall be ductile iron or fused joint high density polyethylene (HDPE) pipe to provide a leak-proof piping system. Flanged joints shall be used for exposed or submerged ductile iron pipe. Pipe joints shall be accepted by Engineer prior to use for temporary ductile iron pipe
- B. Rigid Piping - Hot dipped, galvanized steel piping. Each pipe joint shall have a ball and socket-type connection, rubber O-ring, and lever closure for positive sealing.
- C. Flexible Piping - Synthetic rubber core, reinforced with synthetic fabric with wire helix, covered with synthetic rubber wrapping. Joint fittings to match rigid piping fittings.
- D. HDPE Pipe - Pipe shall be HDPE ASTM C3350, Bluestripe. Pipe shall be minimum DR-9, 200 psi working pressure.
 - 1. Fittings shall be HDPE anchor fittings, butt fusion welded to pipe. Fittings shall include stainless steel stiffener, insert, and all other accessories required. Pipe and anchor fitting shall be the same size.
- E. All pipe and fittings shall have a pressure rating a minimum of 50 percent higher than the highest working pressure expected in the system based on the existing piping pressures or on the Contractor's bypass pumping design.

2.03. TEMPORARY PLUGS

- A. Plugs shall be inflatable and designed for the specific purpose of providing temporary plugging of active pipes. Sewer plugs shall be pneumatic and capable of accommodating the maximum allowable surcharge heads that may be experienced during the construction of this project.
- B. All plugs shall be firmly attached to a stationary object at ground level by a steel cable in order to prevent loss of plugs in pipelines.

PART 3 EXECUTION

3.01. GENERAL

- A. Install, operate and maintain temporary pumping systems and appurtenances, including but not limited to, associated piping, valves, instrumentation, controls, and accessories, in accordance with the manufacturer's instructions. Provide all oil, fuel, grease, lubricants, tools, and spare parts required for operation and maintenance of the temporary pumping systems for the duration of use. Remove all temporary pumping systems and appurtenances equipment following the completion of temporary pumping.
- B. Contractor is responsible for proper operation of complete temporary pumping systems.

- C. Adequate hoisting equipment for each pump and accessory shall be maintained on the project sites.
- D. Provide hay bales and tarping systems to enclose all exterior pumps and engines to further reduce noise level, if required.
- E. Demonstrate all temporary pumping systems to Owner and/or Engineer for conformance with the Contract Documents prior to use. Measure the noise output during the demonstration phase and provide the results to Engineer.
- F. Temporary pumping systems shall be placed in service a minimum of 72 hours before any work requiring use of the temporary pumping system may begin. Demonstrate continuous trouble-free operation for entire 72-hour period.
- G. Temporary pumping systems shall remain operable until all components of new work requiring temporary pumping systems have successfully completed all required testing. Once activated, do not decommission without prior approval of the Owner and Engineer.
- H. Once written permission is issued by the Engineer, remove all components of the temporary pumping and piping systems. After removal of temporary pumping systems, perform all restoration work to the satisfaction of the Owner.
- I. Take precautions to prevent spills when cutting pipelines or decommissioning existing piping.

3.02. FIELD QUALITY CONTROL AND MAINTENANCE

- A. Testing on Installation - The Contractor shall perform leakage and pressure tests of the bypass piping, using clean water, prior to actual operation if directed by the Engineer. The test pressures shall be 1.5 times the expected operating pressures. The Engineer will be given 24 hours' notice prior to testing.
- B. Routine Inspection and Maintenance
 - 1. The Contractor shall inspect all operating bypass pumping systems each weekday or more frequently as necessary to ensure the proper operation of the system. Suction and discharge piping shall be cleaned to maintain the required performance of the bypass pumping system.
 - 2. The Contractor shall ensure that the bypass pumping system is properly maintained.
- C. Extra Materials
 - 1. Spare parts for pumps and piping shall be kept on site as required.
 - 2. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

3.03. PREPARATION

A. Precautions

1. The Contractor is responsible for locating any existing utilities in the area selected for installation of the bypass pipelines. The Contractor shall minimize the disturbance to existing utilities and shall obtain approval from the Owner and Engineer for any relocation of the bypass pipeline. All costs associated with the relocation of utilities and obtaining of approvals shall be paid by the Contractor.
2. During all bypass pumping operations, the Contractor shall protect the bypass pumping and piping facilities from damage inflicted by equipment. The Contractor shall be responsible for all intentional or accidental physical damage to the bypass pumping and piping system caused by human or mechanical failure or interference.
3. During installation of the bypass pumping lines, the Contractor shall make every effort to minimize the disruption of work at the project site. The Contractor shall protect all structures or other obstacles in the path of the pipeline from damage through the use of shields and buffering devices.
4. Preconstruction videotapes shall be produced by the Contractor to document the preconstruction condition of the pipeline route.

END OF SECTION

SECTION 01555

WET WELL CLEANING AND DISPOSAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Removal and off-site disposal of sludge, grit, and sewage from the existing wet Pump Station which is receiving upgrade modifications.
- B. Pressure wash walls and floor of the existing wet well at the Pump Station prior to completing modifications.

1.02. SYSTEM DESCRIPTION

- A. The Contractor will provide all equipment, materials and labor for removing the entire contents from the structures named in Article 1.01 of this section. Contractor will provide temporary storage, if required, and transportation to an off-site disposal area approved by the New York State Department of Environmental Conservation (NYSDEC) (or appropriate state agency if location is out of state).

All activities associated with handling and disposal procedures shall be in accordance with regulations set by the NYSDEC and the U.S. Environmental Protection Agency, all local ordinances and laws, and the Contract Documents. If sludge and grit are to be hauled out of state, the appropriate regulations for transportation and disposal in that state will be followed.

Isolate pump station from influent flow through implementation of bypass pumping as specified in Section 01540 and as shown on the Drawings.

- B. Contractor will wash the interior of all structures with high pressure washwater following removal of contents. All concrete and appurtenances shall be visible and free of accumulated sludge, scum, grit or other foreign material.

1.03. REGULATORY REQUIREMENTS

- A. Conform to applicable local and state codes for legal hauling and disposal of sludge, scum, grit, and washwater.
- B. Obtain necessary permits including those required by NYSDEC for legal hauling and disposal of sludge, scum, grit, and washwater.
- C. Conform to all applicable state and federal codes for confined space entry requirements.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. REMOVAL OF WET WELL CONTENTS

- A. The Contractor is responsible for providing labor, materials, equipment and supplies necessary to remove the entire contents from the facilities to be upgraded, for dewatering (as required), all material removed, and for temporary hauling and disposal of the dewatered material. This shall include all pumps, piping, supports, wiring, mechanical equipment, trucks, cranes, buckets, loaders, etc., required for complete operation. Contractor is required to remove the entire contents of each wet well whether or not the material is pumpable. The means and methods required for removal of all material is to be determined by the Contractor.
- B. The Contractor is responsible for collecting and disposing of filtrate, wash water from cleaning, or other refuse material which is produced during the operations. The filtrate and wash water may be piped to the sanitary sewer piping. The Contractor shall coordinate the operations with the Engineer and the Owner prior to the start of work.
- C. Material which is removed and/or dewatered must be immediately disposed. Material may not be stored at the site.
- D. During the removal, dewatering and disposal of material, the Contractor must provide the capability to add potassium permanganate or other acceptable chemical to control odors. Contractor must furnish the chemical and required metering and feed equipment for odor control.
- E. Contractor is responsible for all piping, wiring, adapters, switches, as required, to connect to Owner's water and electric power supply. Coordinate with Owner prior to connections.

3.02. PROTECTION OF EXISTING FACILITIES

- A. Care shall be taken not to damage the existing structure and/or facilities during removal of the sludge, grit, and foreign material.
- B. In the event of damages to existing facilities, the Contractor shall immediately notify the Owner and Engineer and shall promptly repair the damage to the satisfaction of the Owner. All repairs shall be performed in a workmanlike manner. Materials used to repair damaged areas shall be equal to and shall reasonably match existing materials. Piping used to repair damaged pipes shall be identical to existing piping.

3.03. WORK HOURS

- A. Contractor shall be responsible to coordinate his schedule with the Owner's operational requirements.

END OF SECTION

SECTION 01564

EROSION CONTROL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Installation of sedimentation and erosion control barriers.
- B. Anchoring all topsoil stockpiles with straw mulch and ringing with haybales.
- C. Protection of catch basins with haybale or silt fence rings.
- D. Inspection of all erosion measures after each rainfall and at least daily during prolonged rainfall.
- E. Repairing immediately any failed sedimentation and erosion control barrier.
- F. Removing and disposing sediment deposits in a manner that does not result in additional erosion or pollution.
- G. Removal of haybales or silt fences after completion of construction and permanent stabilization of erosion.
- H. Removal of sedimentation barriers after completion of construction.

1.02. PERFORMANCE REQUIREMENTS

- A. Observe government policy established by United States Environmental Protection Agency (USEPA) Memorandum 78-1.
- B. Observe requirements set forth by the Federal Highway Administration Task Force 25.
- C. Conform all erosion and sedimentation control measures of "New York Guidelines for Urban Erosion and Sediment Control" published by USDA Soil Conservation Service.

1.03. PLAN

- A. Taking into account specific constraints or other criteria outlined herein, the Contractor shall prepare a detailed plan which sets forth his program of operations to effectively control erosion and sediment-runoff at all times during construction and during the one-year guarantee period following completion of the work.
 - 1. Two copies of the plan shall be filed with the Engineer.
 - 2. At least one copy shall be kept at the project site at all times, and shall be made available for examination by authorized representatives of the regulatory agencies having jurisdiction over the project.

3. The plan shall be arranged so as to include:
 - a. Chronological completion dates for each temporary (and permanent) measure for controlling erosion and sediment.
 - b. Location, type and purpose for each temporary measure to be undertaken.
 - c. Dates when those temporary measures will be removed.
4. The plan shall be submitted within 10 days after the Notice to Proceed.
5. Submit in accordance with Section 01300, Submittals.

PART 2 MATERIAL AND PRODUCTS

2.01. MATERIALS

- A. Hay/Straw Bales - Shall be securely tied and measure 14 inches by 18 inches by 30 inches long or greater.
- B. Silt Fence
 1. Super Silt Fence – As manufactured by Geofabrics or equal.
 2. Silt fence shall be constructed using fence posts and wire fence or prefabricated units in accordance with New York guidelines for urban erosion and sediment control.
- C. Stakes and Fasteners
 1. Shall be two #3 rebar or two 2-inch by 2-inch minimum hardwood stakes for each hay/straw bale.
 2. Shall be a minimum of 2-inch by 2-inch minimum by 48-inch hardwood post for silt fences.
- D. Erosion Control Fabric - North American Green Type S75 or equal shall be used.

2.02. PRODUCTS

- A. Sediment Barriers - Sediment barriers shall be hay or straw bales, stone, silt fences or other approved materials that will prevent migration of silts and sediment to receiving waters.
- B. Mulch and Seeding - Mulch and seeding shall be in accordance with requirements of Tables 1 and 2 of this section.
- C. Diversion Terraces - Diversion terraces shall be installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes.
- D. Interceptor Channels - Interceptor channels shall be installed across disturbed areas where the slope is running parallel to the direction of trenches.

- E. Trench Barriers - Trench barriers shall be used where the disturbed area is sloped in direction of the pipeline, when the slope exceeds 15 percent.
- F. Stabilized Construction Entrances – Stabilized construction entrances shall be installed at each work vehicle entry point.
- G. Geotextile Dewatering Bag – Geotextile dewatering bags are to be used to trap sediment from dewatering activities.

PART 3 EXECUTION

3.01. GENERAL REQUIREMENTS

- A. General Drawings do not show all of the necessary control measures to prevent erosion and sedimentation.
 - 1. It is the General Contractor's responsibility to design, implement and maintain erosion and sedimentation control measures which effectively prevent accelerated erosion and sedimentation.
- B. All erosion and sedimentation control measures shall be inspected by the Contractor daily and immediately after periods of rainfall.
 - 1. Repair and/or maintenance of sedimentation and erosion control measures will be made as soon as needed.
 - 2. The Contractor will be held responsible for the implementation and maintenance of all control measures on this site.
- C. Land disturbance shall be kept to a minimum.
 - 1. Restabilization will be scheduled immediately after any disturbance.
- D. Silt fences or haybales will be installed along the toe of all critical cut and fill slopes.
- E. Catch basins will be protected with silt fences or haybales throughout the construction sequence and until all disturbed areas are stabilized.
- F. Erosion and sedimentation control measures will be installed prior to all construction activities.
- G. Sediment removal from control structures shall be the responsibility of the Contractor.
 - 1. Sediment shall be disposed of in a manner which is consistent with overall intent of plan and which does not result in additional erosion.
- H. The erosion and sedimentation control measures described herein are intended as a general guide for the Contractor.

1. It is the Contractor's responsibility to provide any and all work necessary to prevent erosion of soil from the construction site and to provide silt fences, haybales or other control measures as the need arises during construction at no additional cost to the Owner.
 - I. Remove all sedimentation and erosion control barriers after completion of construction and permanent stabilization of erosion.
- 3.02. DIVERSION TERRACES
- A. Diversion terraces shall be used as a temporary measure installed on the uphill side of the disturbed areas to divert surface runoff away from unstabilized slopes, and the project area.
 - B. Recommended Minimum Dimensions
 1. Height - 1.5 feet
 2. Top Width - 2 feet
 3. Side Slopes - 2:1 or flatter
 4. Material - Soil
- 3.03. INTERCEPTOR CHANNELS
- A. Interceptor channels shall be used across disturbed areas where the slope is running parallel to the direction of trenches.
 - B. Interceptor channels reduce erosion by intercepting storm runoff and diverting it to outlets on the lower side of the disturbed area where it can be disposed of having minimum erosion impact.
 - C. Recommended Dimensions and Materials
 1. Depth - 0.5 feet
 2. Width - 2 to 4 feet
 3. Side Slopes - 2:1 or flatter
 4. Spacing - Where required
 5. Material - Stable on-site material
- 3.04. TRENCH BARRIERS
- A. Trench barriers shall be used where the disturbed area is sloped in the direction of the pipeline, when the slope exceeds 15 percent.
 - B. Trench barriers shall be earth-filled sacks or piled stone, stacked to the top of the trench after installation of the sewer and prior to backfill, if backfill is delayed.

C. Trench barriers shall act as an erosion check by preventing the washout of the trench.

D. Recommended Dimensions and Materials

1. Height - To top of trench.
2. Spacing - Approximately every 150 feet.
3. Material - Earth-filled sacks or piled stones.

3.05. SEDIMENT BARRIERS

A. Sediment barriers shall be used at storm drain inlets; across minor swales and ditches; and at other applications where the structure is of a temporary nature and structural strength is not required.

1. Sediment barriers are temporary berms, diversions, or other barriers that are constructed to retain sediment on-site by retarding and filtering storm runoff.

B. Recommended Materials and Dimensions

1. Hay or Straw Bales

- a. Bales should be bound with twine.
- b. Bales should be anchored to the ground with fence posts, wood pickets, or #3 rebar. Two anchors per bale are required.
- c. Bales shall be installed so that runoff cannot escape freely under the bales.
- d. Height - 1.5 feet

Width - 1.5 to 3.0 feet

Cross-Sectional Area Required Per Tributary Acre - 50 square feet

2. Stone

- a. Height - 1.5 to 2.0 feet (uniform top elevation) top
- b. Width - 3 to 5 feet
- c. Side Slopes - 3:1 or flatter
- d. Cross-Sectional Area Required Per Tributary Acre - 20 square feet
- e. Material - Coarse rock or stone

3. Brush

- a. Brush should be bound with twine.
- b. Brush should be anchored such that it does not move and runoff cannot escape freely under the barrier.
- c. Height - 1.5 to 2.0 feet

Cross-Sectional Area Required Per Tributary Acre - 15 square feet

4. Silt Fence

- a. Synthetic fabric 48 inches wide for fencing material.
- b. Hardwood stakes shall be minimum 2-inch diameter spaced at 8 to 10 feet apart for posts.
- c. Height - +30 inches above ground.

3.06. MULCH

- A. Used alone or in conjunction with other structural or vegetative erosion control measure, mulch is applied on any disturbed area which is subject to erosion, for protection of disturbed soil or newly reseeded areas.

3.07. EROSION CONTROL FABRIC

- A. Erosion control fabric shall be used on slopes greater than 10 percent. Prior to installation of the erosion control fabric, the underlying layer is to be graded as shown on the Drawings.

3.08. VEGETATION

A. Temporary Vegetation

- 1. The planting of temporary vegetative cover shall be performed on disturbed areas where the earthmoving activities will be ceased for a period of more than 45 days.
 - a. The vegetation shall provide short-term rapid cover for the control of surface runoff and erosion, until permanent vegetation can be established or earthmoving activities can resume.
- 2. Table 2 gives recommended types of temporary vegetation, corresponding rates of applications, and planting seasons.
 - a. In situations where other cover is desired, the recommendations of the local and County Conservation Districts shall be followed.

B. Permanent Vegetation

1. Planting of various permanent vegetative covers shall be performed on disturbed areas where the earthmoving activities have ceased. The vegetation shall reestablish ground cover for the control of surface runoff and erosion.
2. The seed bed for permanent vegetative cover shall be prepared by using lime and fertilizer.
 - a. If the time of the seeding occurs during a dry period, mulch shall be applied to conserve soil moisture.

TABLE 1
MULCH MATERIALS, RATES AND USES

Mulch Material	Quality Standards	Application Per 1,000 Sq.Ft.	Rates Per Acre	Depths of Application
Straw or Hay	Air-dried Free from coarse	75-100 lbs. 2-3 bales	1.5-2.5 tons 90-120 bales	Lightly cover 75 to 90% of surface
Wood Chips	Green or air-dried	500-900 lbs.	10-20 tons	2" - 7"

TABLE 2
TEMPORARY SEEDINGS FOR EROSION CONTROL OF CONSTRUCTION SITES

Species or Mixture For Temporary Cover	Percent By Weight	Seeding Rates in Lbs. Per 1,000 Sq.Ft.	Recommended Seeding Dates
Annual Rye Grass	100%	1	April 1 to June 1 and August 15 to October 15
Field Broomegrass	100%	1	March 1 to June 15 and August 15 to September 15
Sudangrass	100%	1	May 15 to August 15

3.09. SPECIAL CONDITIONS

- A. Prohibited Construction Practices -** Prohibited construction practices include but shall not be limited to the following:
1. Dumping of spoil material into any stream corridor, any wetlands, any surface waters or at unspecified locations, even with permission of the property owner.
 2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or any surface waters.
 3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
 4. Damaging vegetation adjacent to or outside of the access road or the right-of-way.

5. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface water or at unspecified locations.
 6. Permanent or unspecified alteration of the flow line of the stream.
 7. Open burning of construction project debris.
- B. Defective Devices - Any erosion and sediment control devices which become damaged, clogged or otherwise non-functional shall be immediately replaced by the Contractor, without additional compensation.
- C. Adjustment
1. If the planned measures do not result in effective control of erosion and sediment runoff to the satisfaction of the regulatory agencies having jurisdiction over the project, the Contractor shall immediately adjust his program and/or institute additional measures so as to eliminate excessive erosion and sediment-runoff.
 2. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. 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 excess costs or damages by the Contractor.

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Products.
- B. Shipping and handling.
- C. Storage and protection.
- D. Substitutions.

1.02. PRODUCTS

- A. Products - Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer, for components being replaced.

1.03. SHIPPING AND HANDLING

- A. Arrange deliveries in accordance with the progress schedule. Allow time for inspection prior to installation.
- B. Coordinate deliveries to avoid conflict with work, conditions at site, work of other Contractors, and availability of personnel and handling equipment.
- C. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry, with identifying labels intact and legible.
- D. Deliver in manufacturer's unopened containers or packaging, dry, with identifying labels intact and legible.
- E. Provide equipment and personnel to handle products by methods to prevent soiling or damage. Protect sensitive equipment and finishes against impact, abrasion and other damage.
- F. Protect sensitive equipment and finishes against impact, abrasion, and other damage.
- G. Promptly inspect shipments to assure compliance with requirements, correct quantities, and identify damage.

1.04. STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.
- C. Provide off-site storage and protection when site does not permit on site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure Products are undamaged and are maintained in acceptable condition.

1.05. SUBSTITUTIONS

- A. Engineer will consider requests for Substitutes or "Or Equal" items after the Effective Date of the Owner-Contractor Agreement, and then only within the time constraints stipulated in the General Clauses and Special Clauses.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor. Furnish evidence that product is unavailable.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Owner the costs incurred by Owner for review and any subsequent redesign services by Engineer, including Engineer's revisions to the Contract Documents, and Engineer's assistance in connection with review by authorities when re-approval is required, if Engineer determines that the item of material or equipment proposed by Contractor is a substitute item.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure
 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01640
EQUIPMENT - GENERAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Submittals.
- B. Performance affidavit.
- C. Equipment design.
- D. Spare parts.
- E. Equipment identification.
- F. Standardization of grease fittings.
- G. Anchors and supports.
- H. Shop tests.
- I. Installation of equipment.
- J. Testing.
- K. Services of manufacturer's representative.
- L. Operation and maintenance manual.
- M. Lubrication schedule.
- N. Failure of equipment to perform.
- O. Guarantee.
- P. Schedule of Equipment Testing and Manufacturer's Services.

1.02. SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300, Submittals.
- B. Submit performance affidavits prior with applicable shop drawings.
- C. Installation Certificates.
- D. Certification of Equipment Compliance.
- E. Operations and maintenance manuals.

F. Training Plans

1. Submit no less than 30 days prior to proposed date for training in accordance with procedures identified in Section 01300, Submittals.
2. Training plan must be approved by Engineer prior to scheduling actual date for training.
3. Provide syllabus with sufficient detail to establish content of training, duration of each topic, and demonstrate adequate content to train Owner's staff on proper operation and maintenance of equipment.

G. DVD recordings of training sessions.

H. Written training reports.

I. Guarantees.

1.03. PERFORMANCE AFFIDAVITS

- A. Provide performance affidavits for products listed in the Schedule of Equipment Testing and Manufacturer's Services, included at the end of this section and as required in the individual technical sections.
- B. Performance affidavits shall be developed by each manufacturer and shall certify to Contractor and Owner, jointly, that manufacturer has examined the Contract Documents and that the equipment, apparatus, process, or system will meet the performance requirements set forth in the Contract Documents in every way. Equipment design, manufacturing, and assembly specifications are an integral part of the performance requirements.
- C. Shop drawings will not be reviewed prior to receipt by the Engineer of an acceptable performance affidavit.
- D. The performance affidavit must be signed by an officer (vice president or higher) of the basic corporation, partnership or company manufacturing the equipment, and witnessed by a notary public.
- E. The performance affidavits shall be in the following format:

Addressed to: (Contractor) and (Owner)

Reference: Contract No.
 (Project)

Text: "(manufacturer's name)" has examined the Contract Documents and verified that the (product) meets in every way the performance requirements and design specifications set forth in Section(s) of the Contract Documents."

Signature: Corporate officers shall be vice president or higher (unless statement authorizing signature is attached).

Notary: Signature(s) must be notarized.

1.04. EQUIPMENT DESIGN

- A. Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA, and other generally accepted applicable standards.
- B. Equipment and appurtenances shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, all conditions of operation, or as required by specifications.
- C. All bearings and moving parts shall be adequately protected by bushings or other approved means against wear, and provision shall be made for adequate lubrication by readily accessible devices.
- D. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, etc., shall be finished in appearance. All exposed welds on machinery shall be ground smooth and the corners of structural shapes shall be rounded or chamfered.
- E. Machinery parts shall conform within allowable tolerances to the dimensions shown on the working drawings. The corresponding parts of identical machines shall be made interchangeable.
- F. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI and OSHA and the State Industrial Code. All rotating shafts, couplings or other moving pieces of equipment shall be provided with suitable protective guards of sheet metal or wire mesh neatly and rigidly supported. Guards shall be removable as necessary to provide access for repairs.
- G. Details promoting maintenance, ease of replacing parts, and lubrication shall be a prime consideration in design.
- H. Products shall be designed for corrosion resistance and shall not be constructed of materials which may prohibit ease of maintenance due to corrosion. All fasteners on areas requiring access for maintenance and lubrication shall be Type 316 stainless steel unless otherwise specified. Zinc- or cadmium-plated fasteners for these areas shall not be used.
- I. Iron and steel products used in this project shall be produced in the United States in accordance with AIS requirements. Refer to Section 01300, Submittals, and Exhibit E for further requirements.

1.05. SPARE PARTS

- A. Provide spare parts as required by individual specification sections.
- B. Provide spare parts that are identical and interchangeable with original parts.

C. For each part (or group of small parts), provide a tag which shall carry the following information:

1. Name and associated tag number(s) of equipment.
2. Name of the part.
3. Manufacturer's name and the date of manufacture.
4. Identification number of the part.

1.06. EQUIPMENT IDENTIFICATION

A. Each piece of equipment shall be provided with a substantial brass or stainless steel nameplate, securely fastened in a conspicuous place and clearly inscribed with the manufacturer's name, year of manufacture, serial number and principal rating data.

1.07. STANDARDIZATION OF GREASE FITTINGS

- A. Provide grease fittings of the hydraulic type, Alemite #1600 Series, Lincoln, or equal.
- B. Coordinate grease fittings on all mechanical equipment to be compatible with a single type of grease gun.

1.08. ANCHORS AND SUPPORTS

- A. Obtain and install all necessary guides, bearing plates, anchor and attachment bolts, working drawings for installation, templates and all other appurtenances necessary for the installation of the equipment specified. Subcontractors furnishing equipment shall also furnish anchors and templates to the General Contractor.
- B. Anchor bolts shall be of size and strength suitable for purpose intended and shall be in accordance with Section 05500, Miscellaneous Fabrications, and the individual specification sections.
- C. Pipe sleeves or other means of adjusting anchor bolts shall be provided where indicated or needed. Equipment shall be leveled by first using sitting nuts on the anchor bolts and then filling the space between the equipment base and concrete pedestal with grout. Where equipment bases (i.e., pumps) are installed with grout holes, subsequent to field testing, those bases shall be totally filled with grout.
- D. Provide grout as required by Section 03600, Grout.
- E. Provide concrete equipment pads or housekeeping pads for all mechanical, heating and ventilating, plumbing and electrical equipment. Coordinate with other contractors before pad placement to confirm dimensions, location and anchor requirements.

1.09. SHOP TESTS

- A. Arrange shop tests of the equipment indicated in the Schedule of Equipment Testing and Manufacturer's Services and individual equipment specification sections.

- B. Arrange for the Engineer to witness performance tests in the manufacturer's shop, if required by the individual specification section.
- C. Pump shop tests shall be conducted and reported in accordance with the Standards established by the Hydraulic Institute. Pump tolerances shall be within limits acceptable by these standards.
- D. Demonstrate by the tests that the equipment characteristics, including any specified pressure, duty, capacity, rating, efficiency, performance, function or other special requirements, comply fully with the requirements of the Contract Documents and that it will operate in the manner specified.
- E. Submit certified copies of the manufacturer's test data and interpreted results as required by Section 01300, Submittals.

1.10. INSTALLATION OF EQUIPMENT

- A. Field modifications shall not be made without prior approval from Engineer.
- B. Install all equipment strictly in accordance with recommendations of the manufacturer.
- C. Provide all necessary guides, bearing plates, anchors, and attachment bolts, working drawings for installation, templates, and all other appurtenances necessary for the installation of the equipment specified.
- D. Anchor bolts shall be of size and strength suitable for purpose intended and shall be in accordance with Section 05500, Miscellaneous Fabrications, and the individual specification sections.
- E. Pipe sleeves or other means of adjusting anchor bolts shall be provided where indicated and where needed. Equipment shall be leveled by first using sitting nuts on the anchor bolts and then filling the space between the equipment base and concrete pedestal with grout. Where equipment bases (i.e., pumps) are installed with grout holes, those bases shall be totally filled with grout after successful completion of Functional Testing and prior to System Demonstration Testing.
- F. Equipment pads shall be provided by the General Contractor. Coordinate with other Contractors before pad placement to confirm dimensions, location, and anchor requirements. Install any additional wiring and conduit systems required but not shown to be installed by the Electrical Contractor.
- G. Water supply and drain piping connection shall be provided by the Plumbing Contract.

1.11. TESTING

- A. Perform all testing in accordance with Section 01660, Testing and Startup.

1.12. SERVICE OF MANUFACTURER'S REPRESENTATIVE

- A. Arrange for the equipment manufacturer to furnish the services of a qualified representative where specified in the Schedule of Manufacturer's Services and the individual specification sections. The manufacturer's representative shall visit the site as many times as needed to fulfill its obligations required by the Contract Documents. The minimum number of days required for manufacturer services is listed in the Schedule of Manufacturer's Services.
- B. Contractor shall be responsible for any additional time required for the manufacturer's representative to resolve equipment installation and/or operation problems due to a lack of coordination between the supplied equipment and the Contract Documents such as, but not limited to, dimensions, electrical problems or performance.
- C. Arrange for the equipment representative to visit the plant on occasions after initial start-up and during the first year of operation if required by the individual specification sections. The purpose of these visits shall be to review equipment operation, assist the operators in correcting operational problems and basic inspection of the equipment.
- D. Manufacturer's representative shall assist and supervise Contractor during installation, testing, and operation of equipment where specified in the Schedule of Manufacturer's Services and the individual specification sections.
- E. Manufacturer's representative shall provide all certificates specified in the Schedule of Manufacturer's Services and the individual specification sections.
 - 1. Installation Certificate - Submit one copy to both Owner and Engineer of manufacturer representative's Installation Certificate indicating that the manufacturer's representative has inspected the installation and that the equipment provided by their organization has been properly installed, aligned, lubricated, and is ready for operation.
 - 2. Certification of Equipment Compliance - Submit one copy to both Owner and Engineer of manufacturer representative's written Certification of Equipment Compliance indicating that the manufacturer's representative has witnessed the Functional Test for the equipment provided by their organization, final adjustments to the equipment have been made, the equipment has been tested to their satisfaction, and the equipment meets all performance and testing requirements included in the Contract Documents, excluding testing to be performed either during or after startup.
- F. Testing Reports
 - 1. Functional Test Reports - Submit one copy to both Owner and Engineer of manufacturer representative's written Functional Test reports including performance test results unless otherwise noted.
 - 2. Performance Testing During or After Startup - When the Contract Documents require performance testing to be conducted during or after startup, submit one copy of performance test results with an updated Certification of Equipment Compliance as previously specified.

G. Training

1. Manufacturer shall provide services of qualified, factory trained, operations and maintenance personnel to instruct Owner personnel in proper care, operation, and maintenance of equipment. At a minimum, training shall include:
 - a. Theory of operation.
 - b. Actual operation.
 - c. Mechanical maintenance.
 - d. Electrical maintenance.
 - e. Instrumentation and alarms.
 - f. Optimization of operation.
 - g. Safe operating and working practices and operation of safety devices.
 - h. Troubleshooting.
 - i. Demonstration of equipment startup procedures, operation, and shutdown procedures using equipment installed under this contract.
 2. Training shall be scheduled with the Owner. Training times shall be dependent on the availability of required Owner staff.
 3. Trainer shall provide all materials and training manuals required for training in quantities required by Owner.
 4. Contractor shall hire a professional video production firm to digitally record and produce video from all training sessions. All videos shall be clear in picture and sound quality and free from shake or vibration. Videos should be edited to include dates of training, subject matter, trainer's name and affiliation, and length of video on the title credits and shall be edited to remove any gaps from the program. Unacceptable training videos should be re-recorded and re-produced.
 5. Provide one digital DVD recording of each training session to the Owner. DVDs and cases shall be labeled with project name, equipment description, date of training, trainer's name and affiliation.
 6. Trainer shall develop a written report for each training session. At a minimum, reports shall summarize training sessions, indicate any problems that may have been encountered during operation of equipment, and include a sign-in sheet identifying all attendees. Contractor shall submit one copy of each training report to both Owner and Engineer.
- H. Manufacturer or manufacturer's representative shall document equipment installation, checkout, startup, testing, and training on GHD Form F-09, attached to this specification.

1.13. OPERATION AND MAINTENANCE MANUALS

A. General

1. Submit operation and maintenance manuals as required by the Schedule of Manufacturer's Services and the individual specification sections in accordance with the procedures identified in Section 01300, Submittals.
2. Prior to completion of the work, and at least 30 days prior to the 50 percent payment, submit for Engineer's review three copies of all preliminary draft operation and maintenance manuals. Preliminary draft operations and maintenance manuals may be submitted separately for individual items.
3. Prior to completion of the work, and at least 60 days prior to the 85 percent payment, submit for Engineer's review three copies of all final draft operation and maintenance manuals. Preliminary draft operations and maintenance manuals may be submitted separately for individual items.
 - a. All comments generated by Engineer during review of preliminary draft operation and maintenance manuals must be adequately addressed prior to submission of final draft operation and maintenance manuals. Final draft operation and maintenance manuals shall be complete in their entirety except for specific information related to testing and startup. Final draft operations and maintenance manuals must be approved by Engineer prior to the following:
 - 1) Training of associated items.
 - 2) System Demonstration Testing.
4. Prior to final payment, provide five copies of the final operation and maintenance manual. The final operation and maintenance manual shall include all required operations and maintenance information consolidated into one manual with multiple volumes. The final operation and maintenance manual shall include testing and startup results where applicable.

B. Manual Preparation - Manuals shall include operation and maintenance information on all systems and items of equipment. The data shall consist of catalogs, brochures, bulletins, charts, schedules, approved shop drawings corrected to as-built conditions and assembly drawings and wiring diagrams describing location, operation, maintenance, lubrication, operating weight, lubrication charts and schedules showing manufacturer's recommended lubricants for each rotating or reciprocating unit, and other information necessary for Owner to establish effective operating and maintenance programs. The following shall also be included:

1. Title page giving name and location of facility, drawing number where shown, and specification section where described.

2. Equipment cover sheet listing the supplied equipment manufacturer's name, brand name, model numbers, serial numbers, equipment installer (provide contact name, address, phone and fax numbers, and e-mail address), equipment supplier (provide contact name, address, phone and fax numbers, and e-mail address), and equipment manufacturer (provide contact name, address, phone and fax numbers, e-mail address, and website address),
3. Performance curves for all pumps and equipment.
4. Approved shop drawings of each piece of equipment.
5. Design criteria for the equipment, in table format. Information shall include standard size information such as length, width, or diameter, and capacity information such as flow and head that is not included in the nameplate table.
6. Troubleshooting in table format as follows:

Problem	Possible Causes	Corrective Action

7. Nameplate data for the equipment in table format. Nameplate information shall include data for the overall assembly and any major components such as motors, gear reducers, etc.
8. Manufacturer's cut sheets and dimensional drawings of each piece of equipment, and details of all replacement parts.
9. Manufacturer's erection, operation, and maintenance instructions for all equipment and apparatus, and complete listing of nameplate data.
10. Complete electrical and control schematics with labeled terminations for all individual pieces of equipment and systems including one line diagrams, schematic or elementary diagrams, and interconnection and terminal board identification diagrams.
11. A description of the controls provided with the equipment.
12. Complete piping and interconnecting drawings.
13. Complete parts list with parts assembly drawings (preferably by exploded view), names and addresses of spare parts suppliers, recommended list of spare parts to be kept "in stock" and sample order forms. Lead time requirements for ordering parts shall be estimated.
14. Instructions with easily understood schematics or diagrams for disassembling and assembling equipment for overhaul and repair.
15. Shop testing results where applicable.
16. Manufacturer's Installation Certificate.

17. Manufacturer's Certificate of Equipment Compliance.
18. Field testing/performance reports where applicable.
19. Manufacturer's equipment warranty.
20. Information not applicable to a specific piece of equipment installed on this project shall be removed from or crossed out on the submissions.
21. Illegible data due to any cause, including poor copy quality or reduction, will not be accepted. Manuals with illegible data will be rejected and returned for correction.

C. Organization - O&M manuals shall be organized as follows:

1. All instructions shall be bound into a series of identical 3- or 4-inch heavy-duty three-ring binders. Where necessary, more than one binder may be used to assemble the data. When two or more binders are used, each book or volume shall be titled to indicate its particular book or volume number and the total number of volumes per set (i.e., Volume 2 of 12). The Contractor shall plan manual content and shall "break" the data between volumes at reasonable locations so no loss in continuity of data presentation occurs.
2. Information shall be organized by specification section, each covering an individual equipment item.
3. Sections shall be listed in a Table of Contents at the front of each volume.
4. Shop drawings 24 inches by 36 inches in size shall be folded to approximately 12 inches by 9 inches with drawing title box exposed along either edge. Shop drawings descriptive of a single item of equipment shall be grouped together and fully indexed on the outside of the folders in a neat and uniform manner.
5. All shop drawings included in the binders and/or folders shall be those previously submitted for review and approval and shall bear Engineer's stamp of approval and comments as originally noted thereon.

D. Electronic Operations and Maintenance Data

1. In addition to the specified printed operations and maintenance materials, furnish all specified operations and maintenance materials in electronic format with the final draft operations and maintenance manual submittals prior to Substantial Completion. Electronic equipment manual files shall be submitted in Adobe Acrobat Reader (.PDF) format.
2. Electronic files shall be submitted on one or more compact disks (650 MB CD). Two sets of compact disks shall be provided, one for Owner and one for Engineer. CDs and covers shall be labeled with the project name, supplier, equipment identification, and specification section. CDs shall be provided in individual hard plastic cases.

1.14. LUBRICATION

- A. For equipment that requires lubrication, manufacturer shall prepare a lubrication schedule for all equipment utilizing lubricants from as few companies as possible (preferably single source).
- B. Include lubrication schedule in the operation and maintenance instructions.

1.15. FAILURE OF EQUIPMENT TO PERFORM

- A. Promptly correct by replacement or otherwise any defects in the equipment, or failure to meet the guarantees or performance requirements.
- B. If Contractor fails to make these correction, or if the improved equipment again fails to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of said equipment, may reject said equipment and order the Contractor to remove it from the premises at the Contractor's expense.

1.16. GUARANTEE

- A. Provide equipment guarantees in accordance with the General Clauses and Sections 01300 and 01700. Guarantee requirements may be added to or modified in the individual specification sections.
- B. Manufacturer Warranties During Correction Period
 - 1. Where indicated in the individual specification sections, provide a one-year manufacturer warranty made out in the name of the Owner, coinciding with the correction period defined in General Conditions Article 13.07.A for the particular piece of equipment.
 - 2. One copy of each manufacturer warranty shall be provided to both Owner and Engineer within 30 days of successful completion of startup.
 - 3. All requirements of the correction period defined in General Conditions Article 13.07 shall apply to the manufacturer's warranty and the equipment supplier obligations shall be the same as Contractor obligations defined in General Conditions Article 13.07 for the particular piece of equipment covered by the warranty.
- C. Special Guarantees - Provide both Owner and Engineer one copy of special guarantees required in individual specification sections. Special guarantees shall be made out in the Owner's name.

1.17. EQUIPMENT SCHEDULE

- A. The attached schedule outlines the various items of equipment specified in other sections and lists the responsibilities of the equipment manufacturer for each section of the specifications.

Contract No. 22-510

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

(continued)

SCHEDULE OF EQUIPMENT TESTING AND MANUFACTURER'S SERVICES

Equipment Item	Spec. Section	Performance Affidavit	Shop Tests	Field Tests	Installation Cert.	Services of Manufacturer's Representative			Operation & Maintenance Manual
						Installation Days	Final Acceptance Days	Instruction Days	
Sluice Gates	11290	No	No	Yes	Yes	1/2	--	--	Yes
Dry Pit Submersible Pumps	11303	Yes	Yes	Yes	Yes	1	1	1	Yes
Terminal Heat Transfer Units	15835	Yes	No	Yes	Yes	1/2	1/2	1/2	Yes
Power Ventilators	15870	Yes	Yes	Yes	Yes	1	1/2	1/2	Yes
Programmable Logic Controllers (PLCs)	17095	No	Yes	Yes	Yes	2	1	1	Yes
Bubbler Level Sensing Equipment	17095	No	Yes	Yes	Yes	--	1/2	1/2	Yes
Level Measurement (Suspended Pressure Transducer Type)	17095	No	No	Yes	Yes	--	--	1/2	Yes
Flow Meters (Magnetic Type)	17095	No	No	Yes	Yes	1/2	1/2	1/2	Yes
Pressure Transmitters and Associated Flow Measuring Equipment	17095	No	No	Yes	Yes	1/2	1/2	1/2	Yes
Gas Detection System	17095	No	No	Yes	Yes	1/2	1/2	1/2	Yes
Circular Chart Recorders	17095	No	No	Yes	Yes	1/2	1/2	1/2	Yes

END OF SECTION

EQUIPMENT GENERAL – ATTACHMENT

PROJECT:		REPORT NO.:	
COMPANY:		DATE:	
NAME OF EQUIPMENT:		PROJECT NO.:	
EQUIPMENT TAG:		CONTRACT NO:	
SPEC SECTION:		MODEL NO.:	
SHOW DRAWING ITEM NO.:		SERIAL NO.:	

_____, as the authorized Manufacturer's Representative for the above-referenced equipment, hereby certifies that we have completely inspected, aligned, operated and adjusted said equipment on this date.

Equipment Evaluation Checklist	Completed and Acceptable	Deficient Explanation Below	N/A
Verify there is no visible corrosion or mechanical damage to the equipment.			
Verify the nameplates are correct.			
Verify that all mountings are secure, all piping is attached, all belts and drives are installed and tensioned correctly, and all safety features are in place.			
Verify that prerequisites and preliminary tests for low voltage motor control centers, adjustable frequency drives, and all other electrified equipment, have been completed. Verify all control and power circuits to the equipment are energized.			
Verify that factory test reports have been received and approved.			
For systems tests, verify that all applicable prerequisites and preliminary tests for subsystems and auxiliary equipment have been completed.			
Bump motors to verify correct rotation.			
Verify operation of seal water system.			
Verify operation of valves and verify proper open or shut positions.			
Check all feed and drain lines.			
Verify the equipment has been checked against the approved shop drawing and complies with all details, including comments by the Engineer.			
Verify that all equipment has been properly lubricated in accordance with manufacturer's requirements.			

Deficiencies:

Corrections:

Special Instructions:

Training (Check One):	
	_____ hours of training on equipment operation and maintenance was given on _____ _____ to the following personnel:
	No training was provided; it will be scheduled for a later date.
	No training is required.

Manufacturer's Certification Statement:			
The equipment is complete, conforms to the requirements of the Contract and is ready for permanent operation. There is nothing in the installation that will render the Manufacturer's warranty null and void.			
Authorized Signature			
Title		Date	
The equipment is ready for permanent operation and nothing in the installation will render the Manufacturer's warranty null and void. The deficiencies noted are minor and will not adversely affect the equipment operation. The deficiencies will be corrected at a later date.			
Authorized Signature			
Title		Date	
The equipment certification cannot be completed at this time.			
Authorized Signature			
Title		Date	

Witnessed by Contractor:			
Authorized Signature			
Title		Date	

Witnessed by Engineer:			
Authorized Signature			
Title		Date	

Attachments (list manufacturer's field report):			

**Attach Manufacturer's Check-Out Report.*

SECTION 01660

TESTING AND STARTUP

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Starting systems.
- B. Demonstration and instructions.

1.02 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems. Attend coordination meetings convened by Engineer.
- B. Notify Engineer 14 days prior to startup of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, driverotation, belt tension, control sequence, or other conditions which may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. When specified in individual specification sections, require manufacturer to provide authorizedrepresentative to be present at site to inspect, check and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.
- G. Submit a written report in accordance with Section 01400 that equipment or system has beenproperly installed and is functioning correctly.

1.03 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate project equipment by a qualified manufacturer's representative who is knowledgeable about the project.
- B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manualwith Owner's personnel in detail to explain all aspects of operation and maintenance.
- C. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance,and shutdown of each item of equipment at scheduled times.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

- E. The amount of time required for instruction on each item of equipment and system is that specified in individual sections and in the table included in Section 01640.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01700

CLOSEOUT AND RECORD DOCUMENTS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Closeout procedures.
- B. Record documents.

1.02. CLOSEOUT PROCEDURES

- A. Contract closeout procedures shall be in accordance with GC-14.06 GC-14.07 and as specified herein.
- B. Correct or replace all defective work in accordance with the requirements of the General Clauses and Special Clauses.
- C. The following items shall be provided by the Contractor prior to Final Application of Payment:
 - 1. Spare parts, maintenance and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; obtain receipt prior to final payment.
 - 2. Provide duplicate notarized copies of certifications for those items with extended transferable warranties beyond one year. Prepare separate submittal for each item.
 - 3. Warranties and Bonds - Provide duplicate notarized copies of certifications for those items with extended transferable warranties beyond one year. Prepare separate submittal for each item.
 - a. Execute and assemble documents from subcontractors, suppliers, and manufacturers.
 - b. Provide Table of Contents and assemble in three D-side ring binder with durable plastic cover.
 - c. Submit prior to final Application for Payment.
 - d. For items of work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.
 - 4. Operation and maintenance manuals as specified in Section 01640, Equipment-General.

1.03. RECORD DOCUMENTS

A. The following supplements the requirements of GC-6.12:

1. Record, keep, and monitor up-to-date record documents of work constructed in the field. Legibly mark in red ink or red pencil to show all changes in, or directly associated with, the work of this contract. Keep entire set of record documents current on a day-to-day basis. Record documents shall be kept on hand in the Contractor's field office and shall be available for periodic examination by Engineer upon request.
2. Examples of annotations that could occur are as follows:
 - a. Change in location or elevation of structures.
 - b. Change in dimensions of structures.
 - c. Elimination of structures.
 - d. Unforeseen modifications to existing structures.
 - e. Relocation of equipment.
 - f. Additions to or expansion of structures.
 - g. Changes in mechanical trades components; (electrical, heating, ventilating, plumbing).
 - h. Measured location of internal utilities or mechanical trade items, which are to be concealed from view, referenced to visible and accessible features of the structure.
 - i. Change in location or elevations of Underground Facilities installed under this Contract.
 - j. Change in materials, such as pipe materials.
 - k. Relocation of existing underground facilities.
 - l. Change in topographical contours of finished earth and paved surfaces.
 - m. Change in elevations of finished surfaces along route of installed underground facilities.
3. Show measurement of pipeline location from edge of pavement, at a minimum of 100-foot intervals.

- B. Final Record Drawings - Provide the pipe sizes and horizontal and vertical location of all valve boxes, air release valves, curb boxes, meter pits, fire hydrants, blowoffs, corporations, fittings, and other appurtenances. The information will be provided digitally in the form of an AutoCAD .dwg file and be consistent with the plan datum and control as shown on the Drawings. . The Contractor will employ the services of a registered professional surveyor licensed in the State of New York to provide elevation information. Contractor can request Contract Drawings in .dwg format from the Engineer. Contractor shall comply with the Owner's and Engineer's requirements in order to obtain the Drawings. Final record drawings shall be prepared in AutoCAD.
- C. At Substantial Completion, affix Contractor's red identification stamp to front cover of each set of record documents and label them as "Record Documents." One set of record documents shall be given to Engineer no later than 14 days after the date of Substantial Completion. Engineer will either approve record documents or return them to Contractor with comments. Contractor shall resubmit record documents until Engineer has no further comments. Affix Contractor's identification stamp, together with the label "Record Documents," as follows:
1. On each drawing, just above the Engineer's title block.
 2. On each shop drawing, just above the preparer's title block.
 3. On the front cover or front page of all other documents.
- D. Final payment to Contractor will not be considered until acceptable record documents have been turned over to Owner.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 02030

DEMOLITION

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Demolition and removal of site-related construction.
- B. Demolition and removal of architectural construction.
- C. Demolition and removal of tanks, related structures, and residual tank contents.
- D. Demolition and removal of process equipment and piping.
- E. Demolition and removal of electrical construction.
- F. Demolition and removal of HVAC construction.
- G. Demolition and removal of plumbing construction.
- H. The limited Hazardous Materials Survey included as Appendix 1 in this Project Manual summarizes sampling undertaken on behalf of Owner. The survey report identifies locations of possible hazardous materials at facilities owned by Westchester County. The survey is intended to be a reference and may not be inclusive of all the hazardous materials present at the project facilities.
- I. The General Contractor is responsible for demolition, removal, and disposal of all hazardous materials. The General Contractor is responsible to coordinate demolition work and sequencing with all other Contractors, the Engineer, and the Owner.

1.02. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Each Contractor shall submit a detailed demolition work plan for all demolition activities including all necessary diagrams and/or drawings accounting for Owner's continuing occupancy and the sequence of construction. A separate work plan shall be developed for demolition and removal of hazardous materials. The demolition work plan shall include the following at a minimum:
 - 1. Identify items to be demolished and discuss the demolition, removal, and disposal procedures.
 - 2. Disposal locations of removed items.
 - 3. Relocation of salvageable items.
 - 4. Temporary storage of items to be reused.

- 5. Time lines and sequence of work.
- 6. Location of temporary barricades, fences, and signs.
- 7. Provisions for disposal of sludge, grit, and debris.
- C. The work plan shall be reviewed by the Engineer prior to the commencement of all demolition work.

1.03. PROJECT RECORD DRAWINGS AND PHOTOGRAPHS

- A. Submit under provisions of Section 01700, Closeout and Record Documents.
- B. Accurately record actual locations of capped utilities, subsurface obstructions.

1.04. REGULATORY REQUIREMENTS

- A. Conform to applicable codes for demolition of structures, protection of adjacent structures, dust control, runoff control, and disposal of materials.
- B. Obtain required permits from authorities.
- C. Notify affected utility companies before starting demolition operations and comply with their requirements.
- D. Do not close or obstruct roadways, sidewalks, hydrants, or parking areas without required permits.
- E. Conform to applicable regulatory procedures if a hazardous environmental condition is encountered at site or if hazardous material disposal is required.

1.05. HAZARDOUS ENVIRONMENTAL CONDITIONS

- A. If an unknown unforeseeable hazardous environmental condition is encountered at the site, or if Contractor or anyone for whom Contractor is responsible creates a hazardous environmental condition, immediately:
 - 1. Secure or otherwise isolate such condition;
 - 2. Stop all work in connection with such condition and in any area affected thereby; and
 - 3. Notify Owner and Engineer (and promptly thereafter confirm such notice in writing).
- B. Resume work in connection with such condition or in any affected area only after Owner has obtained any required permits related thereto and delivered to Contractor a written notice specifying under what special conditions work may be resumed safely.

1.06. SEQUENCING

- A. Sequence demolition work to conform with provisions of Section 01010, Summary of Work.

- B. The General Contractor is responsible for demolition, removal, and disposal of all hazardous materials. The General Contractor is responsible to coordinate hazardous materials demolition work, and sequencing with all other Contractors, the Engineer, and the Owner.
- C. Existing equipment and structures shall not be demolished or removed from service until the new replacement equipment and material necessary to construct the new structures and complete the work is on site and ready for installation. Treatment processes shall not be removed from service unless all necessary equipment and material necessary to complete the work is on site and ready for installation. Contractor shall minimize the time equipment and treatment processes are out of service.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

- A. Notify Owner and Engineer at least 48 hours in advance of intended start of demolition operations in each affected area.
- B. Provide, erect, and maintain temporary barriers, signs, and security devices.
- C. Erect and maintain temporary partitions and weatherproof closures to prevent spread of dust, odors, and noise in areas of continued Owner occupancy identified in Section 01010, Summary of Work.
- D. Protect existing structures, equipment, appurtenances, architectural features, and materials which are not to be demolished. Prevent movement or settlement of adjacent structures.
- E. Protect existing site-related items such as pavements, walkways, parking areas, curbs, aprons, and landscaping features which are not to be demolished.
- F. Protect existing electrical; heating, ventilating, and air conditioning; and plumbing systems, including related components, which are not to be demolished.
- G. Mark location of underground utilities.

3.02. DEMOLITION REQUIREMENTS

- A. Confine demolition operations within the contract limits.
- B. Conduct operations to minimize interference with adjacent and occupied building areas. Maintain protected egress and access at all times.
- C. Cease operations immediately if adjacent structures appear to be in danger. Notify Engineer. Do not resume operations until directed.

- D. All materials, except rubble and non-metallic scrap, shall become the property of the Owner if required.
- E. Dispose of rubble and non-metallic scrap.
- F. Dispose of designated hazardous materials in accordance with the nature of the material, required handling and disposal procedures, regulatory requirements, and applicable permits.

3.03. DEMOLITION

- A. Break up and remove slabs-on-grade, pavements, curbs, aprons, etc., and related items in designated areas.
- B. Break up and remove foundation walls, footings, etc., including any below-grade concrete slabs, to a point 2 feet below grade.
- C. Break up and remove concrete structures and tanks, including walls, piers, base slabs, cover slabs, etc.
- D. Empty and remove buried tanks, meter pits, and associated piping.
- E. Backfill, compact, and rough grade areas excavated, including cavities created by removal of demolished items, in accordance with Section 02223, Backfilling.
- F. Disconnect cap, and identify utilities within demolition areas.
- G. Remove designated buried sewer and storm drain piping systems, capping with concrete plugs those segments to be abandoned, and provide temporary capping of those segments to be reused.
- H. Disconnect and remove designated process piping systems, including valves and fittings; provide temporary capping of those segments of the system to be reused. Plug openings in walls and floors where utilities are removed.
- I. Detach, dismantle, and remove metal components of process equipment from designated buildings, including miscellaneous metal work items associated with access to and operation of such equipment.
- J. Carefully disconnect support, protect, and remove designated equipment to be reused on the project or salvaged for Owner's future use.
- K. All removed materials and equipment designated for reuse on the project, or salvaged for Owner's future use, shall be protected from damage and from deterioration by weather.
- L. Remove and dispose of demolished materials as work progresses. Do not burn materials; do not bury materials.
- M. Patch and refinish existing visible surfaces which are to remain in accordance with Section 01039, Coordination and Meetings.

- N. Paint designated metal surfaces and reinforcing steel exposed by demolition operations, in accordance with Section 09900, Painting.
- O. Remove temporary barricades, partitions, signs, etc.
- P. Remove and dispose of residual materials such as grit, sludge, debris, trash, and other scrap.
- Q. Upon completion of demolition operations, leave areas in a clean condition.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Removal of surface debris, rubbish, snow and water without unnecessary excavation of topsoil and subsoil.
- B. Removal of paving, curbs and walks.
- C. Removal of trees, shrubs, and other plant life.
- D. Removal of stumps and root system of trees and shrubs.
- E. Disposal of excess materials, trash, and debris.
- F. Topsoil excavation and stockpile reusable topsoil for later use.

1.02. REGULATORY AND DISPOSAL REQUIREMENTS

- A. Coordinate clearing work with utility companies.
- B. Conform to applicable local, state and federal codes for environmental requirements, disposal of debris, and stockpiling
- C. On-site disposal of surplus materials, if permitted by the Owner, shall be as approved by the Engineer.
- D. Make all arrangements for disposal sites, unless the Owner designates special locations. All expenses for disposal shall be borne by the Contractor. Bidders shall carefully investigate all aspects of surplus material disposing operations.
- E. Prior to depositing surplus material at any off-site location, obtain a written agreement between Contractor and the owner of the property on which the disposal of the material is proposed. The agreement shall state that the owner of the property gives permission for the Contractor to enter and deposit material of a particular classification on the owner's property at no expense to the project Owner, and shall include any other conditions pertinent to the situation as agreed upon by each party. The owner of the property is responsible for all risks associated with the surplus material. The project Owner is not liable for damages associated with the surplus material. The agreement shall be reviewed with and approved by the Engineer and Owner prior to depositing surplus material at any off-site location.
- F. Follow standard horticultural practice for cutting and/or pruning of trees, brush, and shrubs.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

- A. Verify that existing plant life designated to remain, is tagged or identified.
- B. Mark limits of clearing by flagging, fencing or other approved methods.
- C. Vehicles used to haul soft or wet material over streets or pavements shall be sufficiently watertight to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles of the Contractor, he shall clean up the same, and keep the crosswalks, street and pavements clean and free from debris.
- D. Identify on-site waste or salvage areas for placing removed materials.

3.02. PROTECTION

- A. Locate, identify, and protect existing utilities that are to remain, including notification of Dig Safely New York.
- B. Install temporary fences (minimum 3 feet high) in accordance with the Stormwater Pollution Prevention Plan and Erosion and Sediment Control Details to protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect bench marks, survey control points, and existing structures from damage or displacement.
- D. Where trees are to be protected or preserved, no excavation and grubbing, except as directly required for construction, shall be performed within the radius of spread of tree branches.
- E. No storage of topsoil materials or construction equipment will be permitted within the radius of spread of such tree branches.

3.03. CLEARING

- A. Clear areas required for access to site and execution of work.
- B. Remove paving, curbs, and walks where required.
- C. Remove trees and shrubs within marked areas. Remove stumps, main root ball, and root system to a root diameter of less than or equal to 1 inch.
- D. Clear undergrowth and deadwood, without disturbing subsoil.
- E. Remove debris, extracted rock, and plant life.

- F. Prune branches and/or roots of trees to be preserved or where they interfere with or obstruct construction operations.
 - 1. If exposed, bend and relocate main lateral roots and tap roots.
 - 2. Engage a state-certified arborist or qualified tree surgeon who shall cut roots and/or branches with sharp pruning instruments without breaking or chopping.
 - 3. Qualified personnel shall paint all cuts with standard tree paint or equivalent which is waterproof, antiseptic, elastic and free of kerosene, coal, tar, creosote, and other harmful substances.
 - 4. Where required, extend pruning procedures to restore the natural shape of the entire tree or shrub.
- G. Damaged Trees - Vegetation which has been damaged by site clearing activities and deemed non-functional by the Owner or Engineer, shall be replaced by the Contractor with vegetation of the same genus and species at Contractor's expense.

3.04. DISPOSAL OF MATERIAL

- A. All material shall be treated as surplus material and disposed of off-site in a legal manner per Article 1.03.

3.05. TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded without mixing with foreign materials.
- B. All topsoil, loam, or other natural organic materials covering such areas shall be removed; and when suitable for reuse as topsoil shall be stockpiled. Stockpiles shall be established only at approved locations and shall be maintained to prevent erosion and contamination until reuse. To prevent intermixing, topsoil shall not be stockpiled immediately adjacent to other stockpiled materials. All excavated materials shall be stockpiled at locations which will not create public endangerment or inconvenience. Stockpiles shall be kept clear of Fire Department and police facilities and equipment and, where possible, clear of driveways, sidewalks, and crossings.
- C. Stockpile in area designated on site to depth not exceeding 8 feet. Protect from erosion in accordance with the Stormwater Pollution Prevention Plan and Erosion and Sediment Control Details. Remove excess topsoil not being reused to a location designated by Owner.
- D. No topsoil shall be removed from the site without Owner's permission.

END OF SECTION

SECTION 02112

PAVEMENT CUTTING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Pavement cutting.
- B. Pavement scoring.
- C. Pavement (concrete) breaking.
- D. Pavement grinding.
- E. Pavement removal and disposal.

1.02. REFERENCES

- A. NYSDOT - Manual of Uniform Traffic Control Devices.

1.03. REGULATORY REQUIREMENTS

- A. Coordinate pavement cutting with utility companies.
- B. Conform to applicable local, state, and federal codes for legal disposal of pavement materials.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

- A. Notify local officials, Fire and Police Departments of streets to be blocked off, detours or restrictions to maintaining of traffic on a daily basis.
- B. Set up barricades, warning signs and traffic direction information prior to start of pavement cutting.
- C. Provide flagmen to direct traffic.

3.02. PAVEMENT CUTTING AND BREAKING

- A. Pavements covering those areas to be excavated shall be broken up, removed, and then disposed of in accordance with Article 1.04 above. All paved areas shall be first cut or scored continuously along a straight line, parallel to and on each side of the centerline of the trench or excavation, at a width sufficient for the trench excavation or structure excavation.
- B. Pavement cuts in concrete pavement or pavement with a concrete base shall be made by scoring or cutting the concrete with a concrete saw. The depth of the saw cut shall be to the full depth of the concrete pavement thickness. Before excavation, the concrete pavement shall then be broken up with hand operated, pneumatic paving breakers, or mechanical drop hammers designed for such purpose, providing they may be used without endangering existing utilities or causing undesirable vibrations. "Headache balls" will not be permitted for breaking up concrete pavement.
- C. Pavements cuts in blacktop pavement shall be made by scoring or cutting the pavement with a concrete saw, wheel cutter, pneumatic paving breaker or drop hammer type pavement cutter. The pavement cut must be continuous, and made for the full depth of the pavement.
- D. Pavement cuts for final pavement replacement shall be made as outlined above. Pavement cuts shall be made parallel to the centerline of the trench, shall be located at a minimum of 12 inches outside the backfilled trench on undisturbed subgrade and shall be in a straight line for minimum length of 100 feet between manholes or between those stations where changes in direction of the installed piping were made. Where a full street width overlay is to be installed the cutbacks may follow the backfilled trench alignment. Loose, torn, cut, marked up or damaged pavement outside the cutback areas shall be removed and replaced at the Contractor's expense and match the proposed permanent paving.
- E. Pavement cuts in driveways shall be made in a straight alignment perpendicular or parallel to the driveway and for its full width.
- F. Pavement cuts in parking areas shall be made in a straight alignment parallel to the centerline of trench.

3.03. PAVEMENT GRINDING AND MILLING

- A. Where shown on the Contract Drawings, the Contractor shall remove a portion of an existing pavement including Portland cement concrete pavement, asphalt Portland cement concrete pavement base course, to the limits and profile specified by grinding, milling, or planing methods. This process shall yield a base upon which a final pavement course will be applied. The Contractor shall employ equipment specially designed and manufactured for the grinding, milling or planing of pavements.

- B. The resulting ground, milled or planed surface shall be thoroughly cleaned and free from dust, loose pavement material or other material. The surface shall be free from gouges, large cracks and unsound, soft or broken-up areas. Gouges from lack of proper control of the grinding, milling or planing machine shall be made level and true by the use of a trueing and leveling course of asphalt concrete if allowed by the Engineer. Cracks greater than 1/4-inch shall be cleaned and filled in accordance with NYSDOT Specification 633.302. Unsound, soft or broken-up areas shall be excavated and repaired in accordance with Section 02576, Pavement Patching.
- C. Contractor shall dispose of all material removed by grinding in accordance with Article 1.03.

END OF SECTION

SECTION 02141

REMOVAL OF WATER

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Providing equipment, materials and labor required to successfully complete the work included in this section.
- B. Maintaining and operating pumps and related equipment, including standby equipment, of sufficient capacity to adequately perform dewatering as required by this section.
- C. Lowering the groundwater table elevation.
- D. Intercepting seepage from excavation slopes.
- E. Controlling groundwater flow that may adversely affect excavation or construction activities.
- F. Collecting, removing and disposing of all excess groundwater.
- G. Collecting, removing, and disposing of all wastewater.
- H. Removing and/or disposing of spoil, excess materials, equipment, trash and debris used for or resulting from the work included in this section.

1.02. REGULATORY REQUIREMENTS

- A. Conform to applicable local, state and federal requirements for legal disposal of water.
- B. Temporary water supplies shall meet requirements of local, state and federal regulatory agencies.
- C. Conform to applicable OSHA standards.

1.03. WELLPOINT DEWATERING SYSTEM

- A. If wellpoint dewatering methods are proposed by Contractor, he shall prepare a plan of dewatering system and discuss plan with Owner and Engineer. Review or comments by Owner and Engineer concerning the proposed plan shall not relieve Contractor of his responsibilities for dewatering his excavations in conformance with this section of the specifications.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

- A. Review subsurface investigation reports and conduct appropriate investigations to become familiar with the groundwater conditions at the site. Allocate sufficient time and use appropriate procedures based on these conditions for dewatering excavations.
- B. Arrange for water sampling and analysis of each water supply source which may be affected by dewatering operations and submit a copy of the results to the Engineer.
- C. Examine adjacent structures and utilities, both existing and under construction, for possible settlement, movement or other adverse effects resulting from dewatering methods or water removal. Take necessary precautionary steps to protect such structures and utilities.
- D. Should the drawdown of groundwater levels by removal or dewatering systems critically reduce or disrupt public or private water supplies, the Contractor shall be prepared to:
 - 1. Provide adequate potable water to the owners or users of the affected water supplies until groundwater levels have recovered, so as to sufficiently restore those deficient water supplies.
 - 2. Provide to the Engineer documentation to confirm that temporary water supplies meet the requirements of local, state and federal regulatory agencies.

3.02. REMOVAL OF WATER

- A. Assume responsibility for site, surface and subsurface drainage. Maintain such drainage as specified herein during the life of the contract.
- B. Supply all supervision, labor, material, equipment, including standby equipment, necessary to maintain a dry excavation as may be necessary to construct the project.
- C. Maintain groundwater in or below the bearing strata at a safe level at all times by methods which prevent loss of fines, which preserves the undisturbed state of subgrade soils and which sufficiently lowers the groundwater level in permeable strata at or below excavation and fill levels such that blowing or unstable conditions do not develop in the bottom or sides of excavation or fill areas.
- D. Protect all adjacent structures, existing and under construction, from settlement, flotation, damage or other adverse effects resulting from water removal or dewatering methods.
- E. Install all drains, ditching, sluiceways, pumping and bailing equipment, wicking, sumps, wells, well points, cutoff trenches, curtains, sheeting and all other equipment and structures necessary to create and maintain a dry excavation and a groundwater level at a minimum of 2 feet below excavation subgrades.
 - 1. As part of any dewatering system, observation wells or piezometers shall be provided and installed, as required, to effectively and efficiently monitor drawdown to required levels.

- F. Discharge water removed from the site to natural watercourses, storm drains, or channels.
 - 1. Large quantities of water shall not be discharged as overland flow. Overland flow is not permitted onto private property.
 - 2. Water shall not be discharged to storm or sanitary sewers without the prior approval of the Engineer or Owner.
 - 3. Water shall be discharged in accordance with the Stormwater Pollution Prevention Plan.
 - 4. Wastewater shall be disposed of in a manner satisfactory to the local Public Health Officer.
- G. Dewatering operations shall cease when all foundations, structures, pipe installations and other excavated areas have been properly backfilled and compacted, and are safe from damage, flotation, settlement and displacement.

3.03. MAINTENANCE

- A. Operate and maintain dewatering and removal operations on a 24-hour basis for the time required to complete that portion of the work which requires dewatering prior to its construction and which requires protection from flotation or displacement of such work until proper backfilling and compaction is completed.

3.04. REMOVAL

- A. After groundwater levels have returned to elevations appropriate for conditions and time of year, without causing damage to the work, remove all dewatering equipment and related equipment from the site and restore site to original conditions or rehabilitate site to meet requirements of Contract Documents.

END OF SECTION

SECTION 02161

SHEETING AND BRACING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Sheeting and bracing installation, removal, and left in place.
- B. Design requirements.
- C. Regulatory codes and requirements.
- D. Materials.

1.02. REGULATORY REQUIREMENTS

- A. All sheeting and bracing including the use of mobile shields shall conform to Public Law 91-596 (Williams Steiger Act); the Occupational Safety and Health Administration Act (OSHA) of 1970 and its amendments and regulations; or to the New York State Industrial Code Rule 23, entitled "Protection in Construction, Demolition and Excavation Operations" as issued by New York State Department of Labor, Board of Standards and Appeals; whichever is the most stringent.
- B. Conform to New York State Industrial Code Rule 53, entitled "Construction, Excavation and Demolition Operations at or Near Underground Facilities" as issued by the State of New York Department of Labor, Board of Standards and Appeals.

1.03. REFERENCES

- A. ASTM A6/A6M - General Requirements.
- B. ASTM A328 - Steel Sheet Piles.
- C. NFPA - National Forest Products Association.

1.04. SUBMITTALS

- A. Contractor shall submit fully detailed drawings and design computations for all sheeting and bracing systems signed and sealed by a Professional Engineer registered in New York State. The submittal shall include dewatering systems and sequences of construction to be followed in placing and removing braces.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Steel - ASTM A36 as required by ASTM A328.

- B. Trench Boxes - Fabricated steel or aluminum.

PART 3 EXECUTION

3.01. PROTECTION

- A. When so designated on the drawings or stated in the specifications or to comply with local, state, or federal (OSHA) regulations, or when sloped excavations are not feasible, not possible or allowed or if excavations endanger adjacent facilities, sheeting and bracing shall be installed by the Contractor.

3.02. DESIGN REQUIREMENTS

- A. All sheeting and bracing shall be designed and monitored by a Professional Engineer licensed in New York State.
- B. Design shall include all loading conditions to which the sheeting and bracing will be subjected during construction.
- C. Design sheeting and bracing systems against failure from the maximum loads that will occur during construction, including surcharge loads and additional loading due to construction equipment.
- D. Design sheeting and bracing systems to enable safe construction of structures, utilities and appurtenances, and prevent excessive ground loss, displacement of adjacent foundations, and displacement of the bottom of the excavation.

3.03. INSTALLATION

- A. Provide all materials, equipment and labor necessary to construct and maintain all required excavation support systems.
- B. Sheeting and bracing support systems shall include, but shall not be limited to, wall support such as wood sheeting, ringwales, lagging, soldier piles, steel sheeting, trench boxes and bracing members such as stringers, wales, struts, rakers, shores, tieback anchors, etc. necessary to prevent damage to the work and for the safety of workers, the general public or adjacent property.
- C. No excavation shall be performed below a line drawn down and away at a slope of two horizontal and one vertical from the nearest footing or grade beam of the existing building or as shown on the drawings without providing sheeting, shoring and bracing to provide lateral support for soils beneath the foundations of the building and to prevent damage to the building.
- D. Design of bracing shall be such as to permit proper construction of the walls and footings and proper installation of the utilities as shown on the Drawings.
- E. Sheeting shall not be driven while concrete is being placed, or within 24 hours after placement, nor during pile load testing.
- F. Do not brace to concrete without written approval of the Engineer.

- G. Install sheeting and bracing systems in a logical sequence as excavation operations are performed.
 - 1. If a prefabricated mobile shield is used, the bottom of the shield shall be maintained no greater than 2 feet above the bottom of the excavation.
 - 2. Openings or troughs created by the use of a shield shall be filled and compacted in accordance with Sections 02223, Backfilling, and 02228, Compaction.

3.04. MAINTENANCE

- A. Maintain sheeting and bracing systems as functional on a 24-hour basis.
- B. Provide a means of determining movement of excavation walls, and adjacent soil, buildings and structures and utilities.
 - 1. If movement or damage occurs, immediately cease all construction activities, install temporary measures to prevent further movement or damage and notify the Engineer.
 - 2. Movement or damage due to failure of sheeting and bracing systems shall be permanently repaired as soon as possible, at no cost to the Owner and at no additional cost for time.

3.05. REMOVAL

- A. Remove sheeting and bracing as the work progresses in a manner which shall prevent damage to finished work, adjacent structures and property.
 - 1. All voids created by removal of sheeting and bracing shall be filled and compacted in accordance to the guidelines of Sections 02223, Backfilling and 02228, Compaction.
- B. Sheeting to be left in place shall be new and unused material. Where shown on Drawings, specified or approved, sheeting shall be cut off as specified, or a minimum of 2-1/2 feet below proposed final grade.
 - 1. Contractor may elect to leave sheeting and bracing in place (cut off as described above) if he elects to do so at his own expense and with Engineer's approval.
 - 2. Provide to the Engineer a drawing of cut-off sheeting locations. Drawing should show site plan with dimensioned locations of sheeting, type of material remaining, and depths or elevations to top and bottom of remaining sheet.

END OF SECTION

SECTION 02205

PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Location of facilities.
- B. Notification of owners and authorities.
- C. Coordination and preparation.
- D. Protection of facilities.
- E. Protection of sewers and storm drains.
- F. Protection of water mains near sewers.
- G. Abandonment of utilities.
- H. Restoration of property markers.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. LOCATION OF FACILITIES

- A. Prior to construction, verify location of existing underground facilities near or adjacent to project.
 - 1. Consult with appropriate Underground Facilities Protection Organization (Dig Safely New York), owners of facilities, and arrange for field stake-out or other markings to show locations.
 - 2. Perform exploratory excavation at key junctures and other critical points to aid in ascertaining locations.
- B. Report field stake-out findings and results of exploratory excavations to Engineer if possible changes in project location or design are indicated because of suspected interferences with existing facilities. Allow Engineer sufficient time to determine magnitude of changes and to formulate instructions in that regard.
- C. If location of an existing underground facility is uncertain, apply careful excavation and probing techniques during construction to locate and avoid damage to same.

3.02. NOTIFICATIONS OF OWNERS AND AUTHORITIES

- A. Prior to construction, notify owners of existing facilities, including local Police and Fire Departments, of general scope, nature and planned progress schedule of the work.
- B. Notify owners of nearby underground facilities when excavating or blasting is to take place in a particular area, allowing them reasonable time to institute precautionary procedures or preventive measures which they deem necessary for protection of their facilities.
- C. When existing utilities, such as sewer, water, gas, telephone, or electric power are damaged or disturbed during construction, immediately notify affected owner and Project Owner.
- D. Notify Police and Fire Departments, including affected owners, immediately if hazardous conditions are created or have the potential for occurring, as a result of damage to an existing facility or as a result of other activities at project site. Hazardous conditions could be created from: fire, explosion, escape of gas, escape of fuel oil, gasoline or industrial fluids, downed electrical wires, and disrupted underground electrical cables.

3.03. COORDINATION AND PREPARATION

- A. Discuss anticipated work schedule with local authorities and owners of utilities at preconstruction meeting, including procedures to be followed if one or more utilities are damaged or disrupted. Develop contingency plans to address Contractor's role in repair of damaged utilities.
- B. Make preparations beforehand to repair and restore damaged utilities, including arrangements for standby materials and equipment to be promptly assembled at site and utilized immediately.
- C. Adjust work schedules and personnel assignments as necessary to conform with requirements of utility owner whose utility is to be temporarily interrupted during construction. Cooperate with utility owner in this regard to minimize the time of interruption.
- D. Make preparations for and conform to applicable requirements of New York State Industrial Code Rule 53 (as amended April 1, 1975) entitled, "Construction, Excavation and Demolition Operations at or Near Underground Facilities," issued by State Department of Labor.

3.04. PROTECTION OF FACILITIES

- A. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the work, including electric, telephone, sewer, water, gas or drainage utilities, are sustained insofar as the requirements of the project will permit.
- B. Protect existing facilities from damage or movement through installation of adequate support systems and use of proper equipment, including application of careful excavation and backfilling techniques in sensitive areas.

- C. Existing utilities and other facilities which are damaged by the Contractor's construction operations shall be promptly repaired by Contractor to the satisfaction of the affected owner or, if he so elects, that owner will perform the repairs with his own forces. Under either arrangement, such repair work shall be done at Contractor's expense.
- D. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify Engineer and consult with affected owner regarding temporary removal and later restoration of the interfering item. Arrange with that owner to remove and later restore the interfering item to the satisfaction of the owner, subject to approval of the project Owner; or, allow affected owner to perform such work with his own forces. Under either arrangement, such work shall be done at Contractor's expense.
- E. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities. No burning of trash or debris is permitted. If permanent fire extinguishers are used, they shall be recharged and in "new" condition when turned over to Owner.

3.05. PROTECTION OF SEWERS AND STORM DRAINS

- A. Where existing sanitary sewers or storm drain systems are being replaced or interrupted, provide temporary bypass pumping or piping to maintain flow around that segment of the Work such that no back-ups occur in existing systems.
- B. Maintain existing manholes, catch basins, and other utility structures in their pre-work condition. Any material or debris entering same due to the Contractor's operation shall be promptly removed.
- C. Storm drains shall be protected in accordance with the project Stormwater Pollution Prevention Plan and Erosion and Sediment Control Drawings.

3.06. PROTECTION OF WATER MAINS NEAR SEWERS

- A. Where a minimum 10-foot horizontal separation or minimum 18 inch vertical separation (bottom of water pipe to top of sewer pipe) cannot be maintained between a water main and sewer line, one or more of the following remedies shall be incorporated in the work. The Contractor shall contact the Engineer if the separation requirements cannot be met and obtain approval prior to incorporating the following remedies.
 - 1. The sewer lines shall be encased in 4,000 psi mix concrete for a length of 10 feet on either side of the water main.
 - 2. Both the water main and sewer line shall be constructed of pressure type joints of ductile iron pipe, and shall be pressure tested to 100 psi to assure watertightness.
 - 3. One full length of water main shall be centered over the sewer line, so that both joints will be as far from the sewer as possible.
 - 4. Relocate water main to obtain 18 inches minimum vertical separation.
 - 5. As directed by the Engineer or federal, state, or local authorities at no additional cost to the project Owner.

3.07. ABANDONMENT OF UTILITIES

- A. Remove existing utilities to be abandoned within limits of trench excavation, or impinging on trench limits.
- B. Open ends of abandoned utilities, or those scheduled for abandonment, shall be bulkheaded by brick masonry or 4,000 psi mix concrete; or by cast iron plugs or caps in small diameter water mains.
- C. Abandoned sewers 36-inch diameter or larger shall be completely filled with sand or gravel or other approved material prior to bulkheading the open end(s).
- D. Abandoned manholes and water valve casings shall be backfilled to grade with approved trench backfill material.
- E. Frames, covers, grates, water valve casing, sections of water piping, hydrants (including standpipe and boot) valves and other items to be abandoned shall, if ordered by Owner, be salvaged for reuse and be delivered to Owner.

3.08. RESTORATION OF PROPERTY MARKERS

- A. Property corner markers, boundary monuments, etc., disturbed or moved by the Contractor's operation shall be restored, in conformance with the property deed description, by a licensed land surveyor. Restoration of the property corner markers or boundary monuments shall be certified by said surveyor on a map prepared by him which shows the work accomplished. One copy of the map shall be given to the property owner and one copy given to the project Owner.

END OF SECTION

SECTION 02222

EXCAVATING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Excavation for tank or building foundations.
- B. Excavation for slabs-on-grade, paving, and landscaping
- C. Excavation for site structures.
- D. Excavating trenches for utilities.
- E. Pipe foundations and bedding.

1.02. FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

- A. Identify required lines, levels, contours, and datum. Review subsurface report and other available site information.
- B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.
- C. Notify utility companies.
- D. Protect above- and below-grade utilities which are to remain.
- E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- F. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- G. Excavations shall be in complete accordance with all details of applicable codes, rules, and regulations including all local, state, and federal regulations including the Occupational Safety and Health Administration (OSHA) Title 29 Code of Federal Regulations Part 1926, Subpart P - Excavations and Trenching Standards.

3.02. CLASSIFICATION OF EXCAVATED MATERIAL

A. Classifications of excavated materials are as follows:

1. Unclassified Excavation - "Unclassified excavation" shall include all material excavated within the authorized lines and grades prescribed in the Drawings. Unclassified excavation shall include "rock excavation" as well as "common excavation" as defined herein.
2. Common Excavation - "Common excavation" shall include all excavation except "rock excavation." All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered "common excavation." All boulders and detached pieces of solid rock or concrete or masonry less than 1 cubic yard in volume shall be classified as "common excavation."
3. Rock Excavation - "Rock excavation" shall include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment. Should a conflict arise as to the classification of excavation as either "common" or "rock," the following test shall be used in the appropriate determination:
 - a. Where practicable, a late model tractor mounted hydraulic ripper equipped with a one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated between 210 and 240 net fly-wheel horsepower, operating in low gear, shall be utilized. Should the suspect material not be effectively loosened or broken down by ripping in a single pass with the aforementioned ripper, the material shall be classified as "rock."
 - b. In situations where interbedded strata of "common excavation" material and "rock excavation" material are encountered in the same excavation, the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections and as approved by the Engineer.
 - c. When rock is encountered in excavations, it shall be removed by jackhammering or any other method suitable and safe considering the proximity of existing utilities or facilities.

3.03. EXCAVATING

- A. Underpin adjacent structures which may be damaged by excavation work, including utilities and pipe chases.
- B. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving, and site structures.
- C. Machine-slope banks to angle of repose or less, until shored.

- D. Excavation cut not to interfere with normal 45-degree bearing splay of foundation. Undercutting of excavation faces will not be permitted.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Hand trim excavation to required undisturbed subgrade. Remove loose matter.
- G. Remove lumped subsoil, boulders, and rock under 1 cubic yard, measured by volume. Refill voids with Mix "C" concrete or compacted gravel/crushed stone.
- H. Notify Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in area until notified to resume operations.
- I. Should the Contractor, through negligence or otherwise carry his excavation below the designated subgrade, Mix "C" concrete or such other materials as may be approved by the Engineer, shall be furnished and placed as backfill in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted in conformance with the requirements of Sections 02223, Backfilling, and 02228, Compaction. The cost of this refilling operation, including any tests associated therewith, shall be borne by Contractor.
- J. Stockpile excavated material in area designated on-site and remove excess material not being reused, from site.

3.04. DISPOSAL OF MATERIAL

- A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed of off-site unless Owner designates an on-site location.
- B. Reuse of excavated material as on-site fill shall conform with Section 02223, Backfilling.
- C. Make all arrangements for disposal sites, unless the Owner designates special locations. All expenses for disposal shall be borne by the Contractor. Bidders shall carefully investigate all aspects of surplus material disposing operations.
- D. Prior to depositing surplus material at any off-site location, obtain a written agreement between Contractor and the owner of the property on which the disposal of the material is proposed. The agreement shall state that the owner of the property gives permission for the Contractor to enter and deposit material of a particular classification on the owner's property at no expense to the project Owner, and shall include any other conditions pertinent to the situation as agreed upon by each party. The owner of the property is responsible for all risks associated with the surplus material. The project Owner is not liable for damages associated with the surplus material. The agreement shall be reviewed with and approved by the Owner prior to depositing surplus material at any off-site location.

3.05. FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400, Quality Control.
- B. Provide for visual inspection of bearing surfaces.

3.06. PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform, plane areas, shaped to receive the foundation components of the building or structure.

END OF SECTION

SECTION 02223

BACKFILLING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Building perimeter and site structure backfilling.
- B. Site filling and backfilling.
- C. Fill under slabs-on-grade and paving.
- D. Classification of materials.
- E. Backfilling trenches for utilities.
- F. Consolidation and compaction.

1.02. REFERENCES

- A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates
- B. ASTM D1556 - Density of Soil in Place by Sand-Cone Method
- C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort
- D. ASTM D2922 - Density of Soil in Place by Nuclear Methods
- E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.03. SUBMITTALS

- A. Granular Materials
 - 1. Granular materials required for filling, backfilling, subbase and other purposes shall be as shown on the Drawings. Prior to bidding, prospective contractors shall familiarize themselves with the available quantities of approved on-site and off-site materials.
 - 2. For each on-site or off-site material proposed, notify the Engineer of the source of the material and furnish to the Engineer for approval a certified gradation analysis (ASTM C136) and a Modified Compaction Test (ASTM D1557) at least 10 days prior to date of anticipated use of such material that has been tested within the last 6 months.

3. The Engineer reserves the right to inspect proposed source of off-site granular material and to order such tests of the materials as he deems necessary to ascertain its quality and graduation of particle size. The Contractor shall, at his own expense, engage an approved testing laboratory to perform such test, and submit certified test results to the Engineer. If similar tests of the material from a particular source were performed previously (within 6 months), submit results of these tests to the Engineer for consideration.
4. No granular materials shall be used on this project for fill, backfill, subbase, or other purpose until approval is obtained from the Engineer, and only material from approved sources shall be used.

PART 2 PRODUCTS

2.01. ON-SITE MATERIALS

- A. Type A, Excavated Material - Material under this classification shall be derived solely from excavations necessary to construct the project to the lines and grades specified. If the excavated material on-site is approved for reuse and is suitable, it shall be used for filling or backfilling purposes. If he so elects, the Contractor may, at his own expense, substitute other types of material in place of Type A material, provided such substitution is approved in advance by the Engineer. All replaced or surplus material shall be disposed of as directed by the Engineer and Owner.

B. OFF-SITE MATERIALS

Within the following specifications where grain size distribution requires a maximum of 10 percent or less material capable of passing the #200 mesh sieve, the percentage of material finer (than the #200 sieve) by weight shall be determined by wet screening in accordance with ASTM D1140. It is the intent of the specifications to allow the use of granular materials from local suppliers. Material specifications shall conform to the requirements of the New York State Department of Transportation, (NYSDOT) and shall conform to the latest NYSDOT Standard Specification.

No gravel, sand, crushed stone or run-of-crusher material shall be used for this project until acceptance is obtained from the Engineer, and only material from approved sources shall be used. A certified sieve analysis from the supplier shall be submitted for the Engineer's acceptance prior to the use of any materials specified in Article 2.02.

C. Type B – Sand and Gravel

1. Shall be a mixture of hard, durable gravel and sand.
2. Shall be free from organic matter, trash, shale, debris, snow ice and other frozen or mechanically deleterious material.
3. NYSDOT Materials
 - a. Subbase course 733.0404, Type 4.

- b. NYSDOT 411.01 gravel surface course meeting the following requirements:

Sieve Size	Percent Passing by Weight
2 inch	100
1/4 inch	30 – 65
No. 200	10 - 20

- c. NYSDOT, Cushion Sand 703-06.
d. NYSDOT, Stone Filling, Light, 733.2102.

D. Type D - Crushed Stone

1. Shall be clean, hard, durable, angular crushed stone.
2. Shall be free from organic matter, trash, debris, snow, ice and other frozen or mechanically deleterious material.
3. Unless otherwise specified, crushed stone shall be composed of limestone pieces, chips and fines.
4. The material shall be obtained from sources which are approved by the NYSDOT, Material Designation 703-0201.
5. NYSDOT Materials
 - a. NYSDOT 703-0201, No. 1 stone.
 - b. NYSDOT 703-0201, No. 2 stone.
 - c. NYSDOT 703-0201, No. 3 stone.

E. Required Materials

1. Trench Backfill - NYSDOT subbase course 733.0404, Type 4
2. Pavement Subbase - NYSDOT subbase course 733.0404, Type 4.
3. Trench Special Bedding - NYSDOT 703-0201, No. 2 stone.
4. Pipe Bedding
 - a. NYSDOT 703-0201, No. 1 stone for greater than 4-inch diameter pipes.
 - b. NYSDOT, Cushion Sand 703-06 for less than 4-inch diameter pipes.
5. Structural Fill - NYSDOT subbase course 733.0404, Type 4.
6. Backfill Adjacent to Structures - NYSDOT subbase course 733.0404, Type 4.
7. Backfill Under Structures - NYSDOT 703-0201, No. 1 stone.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify fill materials to be used are acceptable.
- B. Verify that all subsurface installations for the project have been inspected and are ready for backfilling.
- C. Verify that foundation walls are properly shored and braced to withstand lateral soil pressures created when backfilled material is placed against such walls.
- D. Verify that underground tanks are anchored to their own foundation to avoid flotation after backfilling.

3.02. PREPARATION

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in situ compaction. Compact to density equal to or greater than requirements for subsequent backfill material.
- C. Inspect spaces to be backfilled and remove all unsuitable materials including sheeting, bracing, forms and debris prior to commencing backfilling operations.

3.03. BACKFILLING

- A. Backfill areas to required contours, grades and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed. Stones larger than 12 inches in any dimension shall be removed or broken. Stones shall not be allowed to form clusters with voids.
- D. Backfill material shall not be placed when moisture content is more than two percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary.
- E. Hydraulic compaction by ponding or jetting will not be permitted except in very unusual conditions and then only upon written request and demonstration of its effectiveness by the Contractor and the written acceptance by the Engineer.
- F. Place and compact fill materials in continuous layers to meet appropriate requirements of Table 1 of Section 02228, Compaction.
- G. Employ a placement and compaction method consistent with Section 02228, Compaction, that does not disturb or damage adjacent walls, drainage systems, dampproofing, waterproofing, protective coverings, utilities in trenches, underground conduits or tanks.

- H. Maintain optimum moisture content of backfill materials to attain required compaction density.
- I. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- J. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- K. Slope grade away from building minimum 2 inches in 10 feet unless noted otherwise.
- L. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradual. Blend slopes into level areas.
- M. Remove surplus backfill materials from site.
- N. Leave fill material stockpile areas completely free of excess fill materials.

3.04. TOLERANCES

- A. Top Surface of Backfilling Under Pavement Subgrade - ± 1 inch from required elevations.
- B. Top Surface of Backfilling Under Paved Areas - $\pm 1/2$ inch from required elevations.
- C. Top Surface of General Backfilling - ± 1 inch from required elevations.

3.05. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400, Quality Control.
- B. Tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 02228, Compaction.
- C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D2922, and with Section 01400, Quality Control.
- D. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Owner.

3.06. PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01500, Temporary Facilities.
- B. Regrade and re-compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 02225

TRENCHING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Excavating trenches for utilities.
- B. Pipe foundations and bedding.
- C. Backfilling and compaction.
- D. Materials.

1.02. REFERENCES

- A. Standard Material Specifications for gravel, sand, crushed stone and gravel-cement mixtures published by the New York State Department of Transportation (DOT).
- B. Occupational Safety and Health Administration (OSHA).

1.03. SUBMITTALS

- A. Submittals for granular material and geotextiles shall be in accordance with Section 02223, Backfilling.

1.04. FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 PRODUCTS

2.01. ON-SITE MATERIALS

- A. On-site material shall be in accordance with Section 02223, Backfilling.

2.02. OFF-SITE MATERIALS

- A. Off-site material shall be in accordance with Section 02223, Backfilling.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify fill materials to be used are approved.

- B. Verify that all subsurface excavations for the project have been compacted, approved, and are ready for backfilling (including installation of geotextiles where required).

3.02. PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Prior to start of construction, notify utility and have staked or marked all underground utilities. Utilities include water, gas, electrical, telephone, cable, storm sewer, sanitary sewers, laterals, and services. In the event such locations indicate a possible interference, or when needed to locate points of connection to existing facilities, perform exploratory excavations to determine the utilities' location and elevation. Provide the Engineer with the results of the exploratory excavations for his review. Allow the Engineer sufficient time to determine any changes required as a result of such exploratory excavations prior to start of construction.
- C. Abandoned pipes and laterals shall be plugged in with 12 inches of concrete or grout or for large pipes with solid brick masonry.
- D. Conduct the operations such that no interruptions to the existing utility system shall occur. Where existing sanitary sewers or storm drain systems are being replaced or interrupted, provide temporary bypass pumping or temporary piping to maintain flow around the work site such that no backups occur in these sewer systems.
- E. Maintain existing manholes, catch basins, and other utility structures above and below grade which are to remain in their pre-work condition. Any material or debris entering same due to the operation shall be promptly removed.
- F. Protect plant life, lawns, rock outcropping, and other features remaining as a portion of final landscaping.
- G. Protect control points, bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic. Preserve the control points provided by the Engineer throughout the life of the project, and accurately replace any such point, which is damaged or moved, at Contractor's expense.
- H. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with specified pipe foundation and compact to density equal to or greater than requirements for subsequent backfill material.
- I. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by backfilling operations.
- J. Maintain a stable, dry backfill area in accordance with Section 02141, Removal of Water.
- K. Remove all water, snow, ice and debris from surfaces to accept fill materials and from the backfill material. No calcium chloride or other chemicals shall be used to prevent freezing.
- L. Areas to receive compacted fill shall be graded to prevent ponding and to provide surface runoff.

- M. Only approved backfill material shall be used.
- N. Only approved geotextile fabrics shall be used.
- O. Backfill operations shall be started at the lowest elevation in the area to be backfilled, and continue, in horizontal layers, upward to the limits specified.
- P. Any crushed gravel stockpiles which have undergone excessive particle segregation shall be remixed and approved by the Engineer prior to placement.

3.03. TRENCH EXCAVATION

- A. Trenches for underground piping, ductwork, drains, and similar utilities shall be excavated and maintained as shown on the Drawings and specified in this Section. Trench widths shall be held within the minimum and maximum limits shown on the Drawings. If a prefabricated, mobile shield is utilized in lieu of conventional sheeting and bracing in trenches, the bottom of the shield shall be maintained as high as possible (preferably above the spring line of the pipe) so as to prevent disturbance of the pipe foundation material and to avoid forces which would tend to pull pipe joints apart when the shield is dragged forward.
- B. Gouged openings or troughs left by the shield shall be filled with additional pipe foundation material and compacted. Installation of sheeting and bracing and use of mobile shields shall be in accordance with details of applicable safety codes, rules and regulations including applicable local, state, federal, and OSHA.
- C. Excavation shall be such that a flat bottom trench of allowable width is established at the required subgrade elevation for subsequent installation of pipe foundation material.
- D. If indicated on the Drawings or when required as a result of unsuitable soil conditions, trench excavation shall be carried below the required subgrade and a special pipe foundation installed in conformance with the Contract Documents. In any event, operations shall result in stable trench walls and a stable base free from standing water, consistent with trench width requirements.
- E. Bedrock, boulders and cobbles greater than 6 inches shall be trimmed back or removed on each side of the trench so that no rock protrudes within 6 inches of the installed pipe. Rock shall also be trimmed back across the bottom of the trench so that no rock, boulder or cobble protrudes within 4 inches of the installed pipe.
- F. In general, trenches shall not be opened for more than 50 feet in advance of installed pipe. Excavation of the trench shall be fully completed at least 5 feet in advance of pipe laying operations. Trenches left open overnight shall be protected as specified within this section and to the satisfaction of the Owner and Engineer. Trenches shall not be left open overnight unless prior approval is approved from the Owner and Engineer.

3.04. EXCAVATION CLASSIFICATION

- A. All material excavation shall be classified in accordance with Section 02222, Excavating.

3.05. UNAUTHORIZED EXCAVATION

- A. The Contractor shall not be entitled to additional compensation for unauthorized excavations carried beyond or below the lines and subgrades prescribed in the Contract Documents. The Contractor shall refill such unauthorized excavations at his own expense, and in conformance with the following provisions:
- B. Should the Contractor, through negligence or for reasons of his own, carry excavations below the designated subgrade, backfill in accordance with Section 02223, Backfilling, in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted. The cost of tests associated with this refilling operation shall be borne by the Contractor.
- C. If the maximum widths of pipe trenches are exceeded, the installed pipes shall be fully cradled using the specified bedding material at the Contractor's expense.
- D. Excavation below subgrade which is ordered by the Engineer because the normal subgrade has been disturbed by the Contractor's operations shall be considered as unauthorized excavation.

3.06. MAINTENANCE OF EXCAVATIONS

- A. All excavations shall be properly and legally maintained while they are open and exposed. Sufficient and suitable barricades, warning lights, flood lights, signs, etc., to protect life and property shall be installed and maintained at all times until the excavation has been backfilled and graded to a safe and satisfactory condition. All signs, markers, barricades shall conform to the requirements of the Manual of Uniform Traffic Control Devices. All barricades, signs and markers shall be reflectorized.
- B. To maintain traffic and safety, temporary plating over trenches consisting of steel plates shall be used to temporarily bridge trench excavations. Plates shall be of size and positioned to provide adequate bearing at plate edges, shall be securely anchored, and shall be fitted in place in a manner to minimize noise when crossed by traffic. Plates shall be of sufficient thickness to safely carry heavy traffic without detrimental deflection; however, unless otherwise specified, the minimum thickness of plates shall be 1-inch.
- C. Plate edges exposed to traffic shall be feathered with asphalt mix as part of trench excavation work. Work includes surveillance and adjustment of plating over trenches which shall be provided by the Contractor during non-working hours, weekends, and holidays.

3.07. PIPE FOUNDATIONS

- A. All pipes, fittings, or specials which are to be installed in the open trench excavation shall be properly bedded in, and uniformly supported on pipe foundations of the various types as specified and shown on the Drawings. Flat-bottom trenches of required width shall be excavated to the necessary depth shown on the Drawings and maintained in accordance with this section prior to installing the foundation. Trenches shall be dewatered and all work performed in a dry trench.

- B. Bedding material shall be spread in maximum of 6-inch layers to the midpoint of the pipe and each layer shall be compacted until the required total depth of the bedding has been built up. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing, as well as mechanical compactors. The Contractor shall perform his bedding operations with care to maintain line and grade.
- C. The pipe foundation above the midpoint of the pipe shall be spread and compacted in 12-inch layers to 12 inches above the top of the pipe. When PVC, plastic or polyethylene pipe is used, do not compact directly over pipe until the depth of backfill has reached 2 feet above the top of the pipe.
- D. Type I - Normal Soil Conditions - Unless shown otherwise in the Drawings, all pipe shall be supported on Type I foundation. The trench shall be excavated 4 to 8 inches deeper than the bottom of the pipe, depending on the pipe's diameter. Acceptable bedding as described in the Contract Specifications shall be furnished, placed and compacted in the trench for its full width such that, after the pipe has been uniformly bedded in this material, the required minimum depth of material remains between pipe and undisturbed trench bottom. Suitable holes shall be provided in the trench bottom to permit adequate bedding of bells, couplings, or similar projections. The bedding shall extend upward to a point 12 inches over the top of the pipe. Minimum width of pipe foundation shall be outside diameter of pipe plus 2 feet 0 inches.
- E. Type II - Moderately Unstable Soil Conditions - When specifically called for on the Drawings, or when ordered by the Engineer, the pipe shall be supported on Type II foundation. The foundation shall be installed where a suitable supporting soil or rock stratum occurs within 2 feet, more or less of the bottom of the pipe. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Install a reinforcing geotextile in accordance with Section 02223, Backfilling, followed by trench special bedding which is then furnished and placed in the trench for its full width. The material shall be spread in 12-inch layers and each layer shall be compacted. Trench special bedding shall extend from the supporting stratum up to an elevation 4, 6 or 8 inches below the bottom of the pipe depending upon the pipe diameter. The bedding material shall then be installed in accordance with Type I pipe foundation requirements.

In the event an underground pipe is shown under a base slab (12 inches thick or greater), the pipe shall be encased in concrete for its entire length under the slab in accordance with details shown on the Drawings.

- F. Type III - Reinforced Concrete Encasement - When specifically called for on the Drawings, or when ordered by the Engineer, the pipe shall be supported on Type III foundation. The trench shall be excavated to a depth below the bottom of the pipe to provide the cover indicated in the pipe encasement detail. Install steel reinforcement and then the excavated space shall be filled, and the entire pipe encased in concrete such that the minimum concrete encasement at any point around the outside barrel of the pipe complies with the minimum cover requirements shown in the encasement detail. The pipe shall be stabilized to prevent flotation during concrete encasement. Concrete mix, formwork, reinforcing, curing, etc., shall be in accordance with the requirements of Division 3 specifications using Mix A or B concrete. Freshly placed concrete shall be maintained free from groundwater and no trench backfill shall be placed until initial concrete set has taken place, but not less than 3 hours after completion of concrete encasement operations. Backfill to a depth of 12 inches over top of concrete before beginning compaction with mechanical equipment.

- G. Unless otherwise shown on the Drawings, the minimum total finished cover over the top of the pipe barrel of all pressure pipe shall be 4 feet.

3.08. GENERAL BACKFILLING REQUIREMENTS

- A. Follow requirements of Sections 02223, Backfilling and 02228, Compaction.
- B. Backfilling shall be started as soon as practicable and after structures or pipe installations have been completed and inspected, concrete has acquired a suitable degree of strength, and subgrade waterproofing materials have been in place for at least 48 hours. Backfilling shall be carried on expeditiously thereafter. Backfill shall be started at the lowest section of the area to be backfilled. Natural drainage shall not be obstructed at any time.
- C. Backfill spaces shall be inspected prior to backfilling operations and all unsuitable materials, including sheeting, bracing forms and debris, shall be removed. No backfill shall be placed against foundation walls on structural members unless they are properly shored and braced or of sufficient strengths to withstand lateral soil pressures.
- D. No backfill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments when placed. No calcium chloride or other chemicals shall be added to prevent freezing. Material incorporated in the backfilling operation which is not in satisfactory condition shall be subject to rejection and removal at the Contractor's expense.
- E. If the Contractor fails to stockpile and protect on-site excavated material acceptable for backfill, then the Contractor shall provide an equal quantity of acceptable off-site material at no expense to Owner.
- F. Remove surplus backfill material from site.

3.09. PIPE TRENCH BACKFILL

- A. Pipe foundations, to a depth of 1 foot above the pipe, shall be placed in 12-inch layers and compacted by approved mechanical methods to ensure firm bedding and side support. Refer to Section 02228, Compaction, for density requirements. For plastic or polyethylene pipe materials, do not compact directly over pipe until the 2 feet of cover has been installed.
- B. The remainder of the trench shall be backfilled and consolidated in accordance with Section 02228, Compaction, with backfill material placed in layers not exceeding 12 inches thick and each layer compacted by a backhoe mounted hydraulic or vibratory tamper, up to 4 feet under pavement (below top of subgrade). The upper 4 feet shall be compacted using hand-guided or small self-propelled vibratory or static rollers or pads in layers not exceeding 6 inches in thickness.

3.10. TRENCH BACKFILL BELOW STRUCTURES

- A. Backfill shall be placed in layers not exceeding 8 inches thick and compacted by mechanical means.

- B. Where pipelines or conduits are to be placed on structural backfill, all backfill under the pipes shall be No. 57 stone placed in 8-inch layers and mechanically tamped, unless an alternate method of supporting such pipes is specified.
- C. Hydraulic compaction by pounding or jetting will not be permitted.

3.11. PERIODIC CLEAN-UP AND BASIC RESTORATION

- A. When work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbances of existing features in or across streets, rights-of-way, easements or private property, the Contractor shall (as the work progresses) promptly backfill, compact, grade and otherwise restore the disturbed area to a basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or function consistent with the original use of the land. The requirements for temporary paving of streets, walks, and driveways are specified elsewhere. Unsightly mounds of earth, large stones, boulders and debris shall be removed so that the site presents a neat appearance.
- B. Perform clean-up work on a regular basis and as frequently as required. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.
- C. Upon failure of the Contractor to perform periodic clean-up and basic restoration of the site to the Engineer's satisfaction, the Owner may, upon five days prior written notice to the Contractor, without prejudice to any other rights to remedies of the Owner, cause such work for which the Contractor is responsible to be accomplished to the extent deemed necessary by the Engineer, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due him.

3.12. TOLERANCES

- A. Reference Section 02223, Backfilling.

3.13. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400, Quality Control.
- B. Tests and analysis of fill material will be performed in accordance with Section 02223, Backfilling.
- C. Compaction testing will be performed in accordance with Section 02228, Compaction.

3.14. PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01500, Temporary Facilities.
- B. Re-grade and re-compact disturbed fill areas subjected to vehicular traffic.

END OF SECTION

SECTION 02226

ROCK REMOVAL

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Removal of subsurface rock encountered during excavation, utilizing mechanical methods.

1.02. UNIT PRICES

- A. Rock Quantity - Determined by quantity of rock indicated in the Contract Documents or as directed by the Engineer.
- B. Determination of Unit Measurements - Identified by site measurements made by the Engineer and calculated in accordance with payment limits established in the appropriate Bid Item Description.

1.03. REFERENCES

- A. Code of Federal Regulations (CFR) - U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Construction Standards and Interpretation, 29 CFR Part 1926.

1.04. DEFINITIONS

- A. "Rock" is defined to include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment.
- B. All boulders and detached pieces of solid rock or concrete or masonry 1 cubic yard in volume or greater, shall be classified as "rock".
- C. Should a conflict arise as to the classification of the material to be removed, the following tests shall be used to aid in the determination:

- 1. Where practicable, a late model tractor-mounted hydraulic ripper equipped with a one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated between 210 and 240 net fly-wheel horsepower, operating in low gear, shall be utilized.

Should the suspect material not be effectively loosened or broken down by ripping in a single pass with the aforementioned ripper, the material shall be classified as "rock".

2. In situations where interbedded strata of "common excavation" material and "rock excavation" material are encountered in the same excavation, the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections as approved by the Engineer.

1.05. SCHEDULING

- A. Schedule work to avoid disruption to occupied buildings nearby.
- B. Schedule work to minimize disruption of vehicular traffic.
- C. Coordinate schedule with local police and fire departments, including owners of nearby existing facilities.
- D. Schedule work to coordinate with concrete placement. Reference Section 03300, Cast-In-Place Concrete.

1.06. SUBMITTALS

- A. Submit plan of action for rock removal. As a minimum, include a site plan showing starting date, preconstruction inspection requirements, location, direction of progress, finish point, and completion schedule.

1.07. ORDER OF WORK

- A. The Contractor shall develop a rock profile over the area to be excavated prior to starting the work.
- B. After the rock profile is determined, proceed with rock removal in accordance with the approved plan of action.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify site conditions and location of nearby buildings, structures and other facilities, recording irregularities which exist prior to work of this section.
- B. Verify locations of nearby underground utilities and structures.

3.02. ROCK PROFILING

- A. After clearing the site, the Contractor shall establish access and make rock corings to determine depths of sound bedrock.

3.03. ROCK REMOVAL - GENERAL

- A. Rock removal by blasting methods is not permitted.
- B. Allow time for Engineer to take site measurements of rock quantities to be removed.
- C. Cut away rock at bottom of excavation to form level bearing surface for foundations of buildings and structures.
- D. Remove shaled layers to provide sound and unshattered base for footings, foundations, and pipe bedding.
- E. In utility trenches, trim rock to 4 inches below bottom of installed pipe and 12 inches wider than outside diameter of installed pipe.

3.04. ROCK REMOVAL - MECHANICAL METHOD

- A. Excavate and remove rock by mechanical methods at locations required by the Contract Documents and when trimming bottom or sides of excavation is necessary to meet project requirements.
- B. Drill holes and utilize expansive tools, wedges, and/or mechanical disintegration compound, as appropriate, to fracture rock.

3.05. FIELD QUALITY CONTROL

- A. Provide for Engineer's inspection of foundation bearing surfaces and cavities formed by removed rock.

END OF SECTION

SECTION 02228

COMPACTION

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Compaction requirements and test methods.
- B. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

1.02. REFERENCES

- A. ASTM D698 - Laboratory Compaction of Soil Using Standard Effort
- B. ASTM D1556 - Density of Soil in Place by the Sand-Cone Method
- C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort
- D. ASTM D2922 - Density of Soil in Place by Nuclear Methods
- E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.03. SUBMITTAL

- A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

1.04. QUALITY ASSURANCE

- A. The Contractor shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, pavement, structure and piping to be placed thereon, or therein, without damage to the new or existing facilities.
- B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.
- C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.
 - 1. This compaction shall be limited to that required to compact loose surface material and shall be terminated in the event that it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.
 - 2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Materials to be compacted shall be as specified in Section 02223, Backfilling.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.
- B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris. Stones larger than 12 inches in any dimension shall also be removed or broken into smaller pieces.
- C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.
- D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.

3.02. PREPARATION

- A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.
- B. Proof-roll all subgrade surfaces to accept fill material.
- C. Each layer of fill shall be compacted to the specified density the same day it is placed.
 - 1. The moisture content of backfill or fill material shall be adjusted, if necessary to achieve the required degree of compaction.
- D. Compact each lift in accordance with Table 1.
- E. Match compaction equipment and methods to the material and location being compacted in order to obtain specified compaction, with consideration of the following guidelines:
 - 1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer materials.
 - 2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.
 - 3. Compaction roller should be lighter in weight than proof-rolling equipment, with a minimum compaction force of 350 lbs. per linear inch (PLI).
 - 4. Vibratory compaction is preferred for dry, granular materials.

5. Hand compaction equipment such as impact rammers, plate or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.
6. Hydraulic compaction by ponding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the Engineer and after a demonstration of effectiveness.
7. Backhoe-mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self-propelled vibratory compactors or static roller.
8. For plastic pipelines (HDPE, PVC, PE, or PB), do not compact directly over center of pipe until backfill has reached 2 feet above top of pipe.

TABLE 1
COMPACTION REQUIREMENTS

Construction Element	Maximum Compaction Layer Thickness (Inches)	ASTM	Minimum Compaction
I. STRUCTURES*			
a. Fill beneath foundation elements and under slabs-on-grade - hand-guided compaction	6	D1557	95%
Fill beneath foundation elements and under slabs-on-grade - self-propelled or tractor-drawn compaction	8	D1557	95%
b. Fill around structures and above footings	12	D1557	95%
II. TRENCHES**			
a. Fill under pipelines and pipe bedding	8	D1557	95%
b. Pipe sidefills and top 4 feet of pipe backfill under pavements	12	D1557	93%
c. Backfill below 4 feet under pavement	12	D1557	90%
d. Backfill under lawns, gardens and cultivated fields	12	D1557	90%
e. All other trenches***	12	D698	85%
III. EMBANKMENTS AND FILLS			
a. Fill under streets, parking lots, and other paved areas	12	D1557	92%
b. Embankments not supporting pavement or structures	12	D1557	90%
c. Rough site grading	12	D698	85%

*Where structural loads are carried by piles, caissons or other deep foundations, minimum compaction may be reduced to 92 percent.

**The first 1 foot above non-plastic pipelines shall have a compacted thickness of 12 inches.

***For cross-country pipelines, lifts may be compacted with a backhoe bucket or other means, and slightly mounded at the surface provided that regrading is performed within the guarantee period.

3.03. FIELD QUALITY CONTROL

A. Material Testing

1. The Engineer reserves the right to order testing of materials at any time during the work. The Contractor shall provide testing at no additional cost to the Owner.
2. Testing will be done by a qualified, independent testing laboratory in accordance with this section and Section 01400, Quality Control.
3. The Contractor shall aid the Engineer in obtaining representative material samples to be used in testing.
4. For each material which does not meet specifications, the Contractor shall reimburse the Owner for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.
5. The Contractor shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

1. The Engineer reserves the right to order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts.
2. Testing shall be conducted for every 25 cubic yards of fill or backfill, or every 50 linear feet of trench backfill placed. Tests are required for each lift of fill or backfill placed.
3. The Contractor shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Engineer.
4. For each test which does not meet specifications, the Contractor shall retest at his cost. If the retest does not meet specifications, the Contractor shall replace and recompact material to the specifications at no additional cost to the Owner.
5. The Contractor shall anticipate these tests and incorporate the time and effort into procedures.
6. Nuclear moisture density testing by "probe" methods will be acceptable for compacted layers not exceeding 12 inches in thickness.
 - a. Nuclear "backscatter" methods will be acceptable only for testing asphalt paving layers not in excess of 3 inches in thickness.
 - b. Only certified personnel will conduct nuclear testing.
 - c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.

C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to material testing materials.

- D. Alternate Methods of Compaction - The Contractor may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Engineer's satisfaction.
- E. Select Material - On-Site
 - 1. Any on-site material may be used for select fill material provided it meets all the requirements of the equivalent off-site material.
 - 2. No on-site material shall be used without prior approval of the Engineer.
- F. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.04. PROTECTION

- A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.
- B. As backfill progresses, the surface shall be graded so as to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.
- C. The Contractor shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction.
 - 1. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION

SECTION 02229

PAVEMENT SUBGRADE

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Subgrade preparation, below either pavement system or gravel access road.
- B. Furnishing natural soils.
- C. Furnishing select borrow material.
- D. Temporary drainage.
- E. Compaction.
- F. Proof rolling.
- G. Removal and replacement of unacceptable materials.
- H. Grading.
- I. Install geotextile fabric.

1.02. REFERENCES

- A. ASTM D698 - Moisture/Density Relations of Soil/Aggregate Mixtures Using 5.5-Lb. Rammer and 12-Inch Drop
- B. ASTM D1557 - Moisture/Density Relations of Soils and Soil/Aggregate Mixtures Using 10-Lb. Rammer and 18-Inch Drop
- C. NYSDOT - Manual of Uniform Traffic Control Devices

1.03. DEFINITIONS

- A. "Subgrade" shall be defined as the foundation layer of natural soils or select material that supports the pavement or gravel access road layers.

1.04. PERFORMANCE AND TESTING REQUIREMENTS

- A. Compaction of subgrade shall meet the requirements for compaction as stated in Table 1 of Section 02228, Compaction.
 - 1. Compaction curves shall be developed for each type of subgrade material when "in-place density" tests are required by the Engineer.
 - 2. The cost of failed compaction tests will be reimbursed by the Contractor.

- B. Proofrolling with 8- to 10-ton pneumatic tire compactors to locate areas of inadequate compaction or soft or rutting areas or other defects in the subgrade surface.

1.05. SUBMITTALS

- A. Submit under Provisions of Section 01300, Submittals.
- B. Granular Materials - Refer to Section 02223, Backfilling.

1.06. REGULATORY REQUIREMENTS

- A. Conform to regulatory agencies having jurisdiction over the work.
- B. Work shall conform to Public Law 91-596 (Williams Steiger Act). Occupational Safety and Health Administration Act (OSHA) of 1970 and its amendments and regulations or to the New York State Industrial Code Rule 23 entitled, "Protection in Construction, Demolition and Excavation Operations" as issued by New York State Department of Labor, Board of Standards and Appeals.
- C. Conform to New York State Industrial Code Rule 53, entitled, "Construction, Excavation and Demolition Operations at or Near Underground Facilities" as issued by the State of New York Department of Labor, Board of Standards and Appeals.

1.07. ENVIRONMENTAL REQUIREMENTS

- A. Provide erosion and sediment controls in accordance with the Stormwater Pollution Prevention Plan and the Erosion and Sediment Control Drawings to prevent debris, stones, and silt from entering drainage systems.

1.08. FIELD MEASUREMENTS

- A. Prior to start of construction, verify by field measurements that existing conditions are as shown on Drawings, notify Engineer of specific differences.
- B. Prior to start of construction, where required, verify by exploratory excavations that existing underground utility locations and elevations are as shown on the Drawings or to confirm marked location and elevation of underground utilities by the organization identified in Section 02205, Protection of Existing Facilities.

1.09. COORDINATION

- A. Coordinate field work under provisions of Section 01500, Temporary Facilities, including maintenance of traffic, access to private driveways, and emergency vehicle access.
- B. Coordinate work with local utility companies (private and municipal).

PART 2 PRODUCTS

2.01. MATERIALS

- A. Natural on-site soils, if suitable, shall be utilized if approved by the Engineer.

- B. Granular materials, if required, shall be as specified in Section 02228, Compaction. The type, size and quantity of granular material shall be that required to prepare a compacted subgrade approved by the Engineer.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.
- B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris. Stones larger than 12 inches in any dimension shall also be removed or broken into smaller pieces.
- C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.
- D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.
- E. All underground utility installations, including culverts, shall be completed, backfilled and compacted prior to completion of subgrade.
- F. Verify that traffic controls and erosion and sediment controls are in place.

3.02. PREPARATION

- A. Temporary erosion and sediment controls shall be installed prior to construction of subgrade.
- B. Temporary drains and ditches shall be constructed as necessary to remove water from the subgrade area.
 - 1. Temporary drainage openings in existing catch basins may be made in a manner acceptable to the Engineer. Such openings to be repaired to the satisfaction of the Engineer.
 - 2. Contractor to prevent the entrance of debris, stones and silt from entering drainage systems, including the use of bales of hay, screens and other desilting methods.
- C. Backfilled areas shall be retested at the discretion of the Engineer.

3.03. INSTALLATION

- A. Construct the subgrade by cutting or filling with material as required.
 - 1. The final subgrade surface shall be fine graded, rolled and compacted to form a smooth, even surface.

- B. The subgrade in fill section shall be placed in maximum 12-inch layers before compaction and compacted before the next layer is spread.
- C. The subgrade surface shall drain to the road edges, be free from holes, bumps, wheel ruts and of standing water, snow, frozen material and organic materials prior to the placement of the next course.
 - 1. Soft or otherwise unacceptable subgrade materials shall be removed and replaced with select on-site material acceptable to the Engineer.
 - 2. Where no suitable on-site is available, granular materials shall be installed and compacted.

3.04. FIELD QUALITY CONTROL

- A. For compaction requirements, refer to Article 1.05 and Section 02228, Compaction Table 1.
- B. Tolerances - The final subgrade surface shall not vary more than $\pm 1/2$ inch from the design grade elevation at any location, parallel to the final road surface as defined by the total roadway thickness.
- C. Proof Rolled - Prior to the placement of the next pavement course, the subgrade surface shall be proof rolled to locate areas of inadequate compaction or defections or soft or rutting areas requiring undercutting, with 8- to 10-ton pneumatic tire compactors.
 - 1. Areas of inadequate compaction to be re-compacted.
 - 2. If additional rolling does not correct an area of unstable condition, then this area and soft or rutted areas shall be removed and replaced with select material and compacted.
 - 3. Where no suitable on-site material is available, granular materials shall be installed and compacted; areas inaccessible to rollers to be compacted by mechanical methods.

3.05. DUST CONTROL

- A. Dust control shall be accomplished by using water, brooming and cleaning methods.
 - 1. Dust control shall be carried out on a daily basis including weekends and holidays.

END OF SECTION

SECTION 02420

GEOTEXTILES

PART 1 GENERAL

1.01. SECTION INCLUDED

- A. Separation geotextile.
- B. Reinforcement geotextile.

1.02. REFERENCES

- A. Quality Control Testing Standards
 - 1. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - 2. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles
 - 3. ASTM D4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
 - 4. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - 5. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - 6. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 - 7. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
 - 8. ASTM D-5261 - Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.

1.03. SUBMITTALS

- A. Submit a 1-foot square sample of each geotextile proposed for use on this project.
- B. Certification that each geotextile meets the criteria listed in Table 02420-1.

1.04. DELIVERY, STORAGE, AND HANDLING

- A. Geotextiles labeling, shipment, and storage shall follow ASTM D4873. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.
- B. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.

- C. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geotextile.

PART 2 MATERIALS AND PRODUCTS

2.01. MATERIALS

A. Separation Geotextile

1. Shall be needle-punched, nonwoven geotextile specifically designed for drainage and separation applications.
2. Shall be composed of polyester and/or polypropylene polymers.
3. Shall meet the criteria listed in Table 02420-1.

B. Reinforcement Geotextile

1. Shall be a woven geotextile specifically designed for reinforcement applications.
2. Shall be composed of polyester and/or polypropylene polymers.

- C. Shall meet the criteria listed in Table 02420-1.

TABLE 02420-1
MINIMUM ACCEPTANCE CRITERIA GEOTEXTILE

Test Description	Test Method	Criteria
<i>Separation</i>		
Mass Per Unit Area	ASTM D5261	≥8 oz/SY
Apparent Opening Size	ASTM D4751	≤No. 70 sieve
Puncture Resistance	ASTM D4833	≥110 lb.*
Tensile Strength	ASTM D4632	≥160 lb.*
Trapezoid Tearing Strength	ASTM D4533	≥80 lb*
Permittivity	ASTM D4491	≥1.1 cm/sec
<i>Reinforcement</i>		
Mass Per Unit Area	ASTM D5261	≥8 oz/SY
Puncture Resistance	ASTM D4833	≥150 lb.
Tensile Strength	ASTM D4595	≥160 lb.*
Trapezoid Tearing Strength	ASTM D4533	≥120 psi*
Apparent Opening Size	ASTM D4751	≤40 sieve

*Minimum acceptance criteria shall apply to both the machine direction (MD) and the cross machine direction (XMD).

2.02. PRODUCTS

- A. Separation Geotextile - The following is a list of materials that meet the specifications in this section:
 - 1. TenCate Mirafi 180N.
 - 2. Propex Geotex 861.
 - 3. Skaps GE 180.
 - 4. Or equal.
- B. Reinforcement Geotextile - The following is a list of materials that meet the specifications in this section:
 - 1. TenCate Mirafi FW 403.
 - 2. Propex Geotex 4x4.
 - 3. Carthage Mills FX-400MF.
 - 4. Or equal.
- C. The above is a short list and may not be the only acceptable materials.

PART 3 EXECUTION

3.01. INSPECTION

- A. The Contractor shall inspect all geotextile upon delivery and verify that the proper materials and quantities have been supplied.
- B. The Contractor shall inspect the subgrade for protrusions or other unacceptable conditions prior to installation of geotextiles.
- C. The Contractor shall continuously inspect needle-punched geotextiles during deployment for broken needles remaining from needle-punching operations.

3.02. PREPARATION

- A. The subgrade shall be prepared as indicated in the specifications.

3.03. PROTECTION

- A. Protect all geotextile materials from damage due to exposure to sunlight, dirt, dust and other hazards.
- B. Maintain the protective wrapping on geotextile rolls at all times.
- C. The geotextiles shall be covered after installation within a 10-day period.

- D. During spreading operations of backfill, a minimum depth of 12 inches of aggregate shall be maintained over the geotextiles when possible. Construction equipment shall not operate directly on the geotextile.

3.04. INSTALLATION

- A. Geotextile rolls shall be positioned as required and unrolled.
- B. When placed on prepared subgrades, geotextile shall be overlapped a minimum of 1.0 feet on all edges.
- C. When geotextile is placed in trenches, the material shall be overlapped a minimum of 1 foot over the top of the trench. Longitudinal seams between adjacent rolls of material shall be overlapped a minimum of 2 feet.
- D. Geotextile rolls shall be cut and laid flat such that buckling of the roll does not occur.
- E. If geotextiles are damaged during any phase of construction or installation, a new piece of the same type shall be cut and placed over the damaged area with a 2-foot minimum overlap and sewn.
- F. Aggregate shall be spread in the direction of overlap wherever possible.

3.05. MAINTENANCE

- A. Maintain geotextile rolls until backfilling operations have completed one lift.

END OF SECTION

SECTION 02510

ASPHALT PAVING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Asphalt paving; top course, binder, and base course.
- B. Driveways and parking areas.
- C. Road shoulders.
- D. Compaction.
- E. Tolerances.
- F. Field quality control.

1.02. REFERENCES

- A. New York State Department of Transportation (NYSDOT) Standard Specifications, dated January 2, 1990.
- B. NYSDOT - Manual of Uniform Traffic Control Devices.

1.03. PERFORMANCE REQUIREMENTS

- A. Paving and repaving accomplished under this contract shall meet the finished grades, elevations and profiles shown on the Drawings.
 - 1. Where pavement replacement is being accomplished, match the sectional profiles of the existing pavement unless otherwise stated herein or shown on the Drawings.
- B. All thicknesses of pavement courses described herein or shown on the Drawings are after completion of compaction.

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Submit certification of plant job mix formulas that have been approved by the NYSDOT.

1.05. QUALITY ASSURANCE

- A. Perform work in accordance with the NYSDOT Standard Specifications, dated January 2, 1990, as amended to date and as they apply to the following:
 - 1. Materials and batch plant requirements.

2. Construction procedures except as modified herein.
 3. Weather and seasonal limitations except as modified herein.
- B. Paving work shall be performed by a qualified paving contractor or subcontractor acceptable to the Owner and Engineer.

1.06. ENVIRONMENTAL LIMITATIONS

- A. Weather and Seasonal Limitations - Asphalt concrete and bituminous surface treatments shall not be placed on wet surfaces or when it is raining or when conditions prevent the proper handling, compacting or finishing of the asphalt concrete or when the surface temperature is less than specified in the following table:

Nominal Compacted Lift Thickness	Surface Temperature Minimum (Note 1)	Seasonal Limits
3" or greater	40°F	None
Greater than 1" but less than 3"	45°F	Notes 2 and 3
0.1" or less	50°F	Notes 2 and 3
Bituminous surface treatments (Note 3)	70°F or greater	Note 4

NOTES:

1. All temperatures shall be measured on the surfaces (lay glass thermometer on surface and read after temperature has stabilized) where the paving is to be placed and the controlling temperature shall be the average of three temperature readings taken at locations ± 25 feet apart.
2. Top course shall be placed only during the period of May 1 to October 15 in all counties except Dutchess, Orange, Rockland, Putnam, Westchester, Nassau, Suffolk, and the City of New York in which top course shall be placed only during the period of April 1 to November 15. In addition, when top course is placed between September 15 and November 15, not less than two rollers shall be furnished and operated by the Contractor.
3. Surface treatments shall be placed during the period of May 1 up to and including the first Saturday after Labor Day.
4. The ambient temperature shall be not less than 50 degrees F in the shade and not more than 95 degrees F.
5. Bituminous paving mixtures for curbs, driveways, sidewalks, gutters and other incidental construction shall be placed on surfaces having a temperature of 45 degrees F or greater. Installation of these items is not subject to seasonal limitations.
6. When work is halted because of weather conditions, limited tonnage enroute to the project may be placed, if permitted, and the mixture is within the temperature requirements.

1.07. COORDINATION

- A. Coordinate field work including maintenance of traffic, access to private driveways, and emergency vehicle access.

1.08. SCHEDULING

- A. Schedule the paving operations such that all paving necessary to provide safe and adequate maintenance and protection of traffic or for protection of previously laid courses is completed within the weather and seasonal limitations.
 - 1. Such scheduling shall include expediting construction operations to permit paving before the seasonal limitations or by limiting the length of work to that which can be completed before the seasonal shutdown.
 - 2. The cost of scheduling and sequencing of work to conform with the seasonal limitations shall be reflected in the bid prices for the related contract items.

1.09. MAINTENANCE

- A. The Contractor shall maintain driving surfaces, free of ruts and potholes, for maintenance of traffic until temporary paving or permanent paving is installed.
 - 1. All temporary paving and pavement replacement shall be maintained in a safe, drivable condition until the pavement wearing course is installed.
 - 2. All subgrade, subbase and base courses shall also be maintained in their specific finish condition prior to placement of the next course.
- B. If the Contractor fails to complete the necessary paving operations prior to weather and seasonal limitations, all temporary materials and work which become necessary as a result of such failure, such as the lowering or shimming of castings and protrusions, drainage of the roadway, providing acceptable rideability, and other work needed for the adequate maintenance and protection of traffic until paving operations can be completed the following paving season, shall be at the Contractor's expense.
- C. For a period of one year after issuance of the Certificate of Substantial Completion, the Contractor shall promptly patch, maintain, repair, and/or replace any pavement that settles or becomes damaged due to settlement or defective materials or workmanship.
 - 1. Areas to be repaired shall be cut out in a square or rectangular shape to the depth matching the top course.
 - 2. The vertical face of asphalt to be painted with asphalt emulsion prior to placing the asphalt concrete.
 - 3. If more than top course depth of 1-1/2-inch settlement has occurred, the pavement shall be removed to the subbase and subbase and/or binder and base course restored to proper grade before restoration of the wearing course.

4. The centerline finished grade, in any case, shall be as shown on the Contract Drawings.

PART 2 PRODUCTS

2.01. ASPHALT

- A. All asphalt pavement courses shall be hot mix asphalt pavement conforming to material requirements of the following:
 1. Top Course - NYSDOT 9.5 F1, Top Course HMA 80 series compaction.
 2. Binder Course - NYSDOT 19 F9, Binder Course HMA 80 series compaction.
 3. Pavement Subbase - NYSDOT Type 1 F9, Asphalt-Treated Permeable Base Course.
 4. Tack Coat - New York State Item No. 407.0103, tack coat, emulsified asphalt.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Permanent restoration of pavements shall not begin until 30 days after trench or structure backfill has been completed in accordance with the applicable specifications or until testing of the installed utility has been completed in accordance with the specifications (whichever is the longest period of time after completion of trench or structural backfill).
 1. Completion of backfill shall include compaction tests to ascertain compliance with degree of compaction required as described in Section 02228, Compaction.
 - a. Verify base conditions
 - b. Verify that compacted subgrade is dry and ready to support paving.
 - c. Verify gradients and elevations of base are correct.
- B. If painted traffic markings on the pavement are to be interrupted by the new pavement replacement, they are to be restored using an approved traffic paint.
- C. Driveway and Parking Areas
 1. Driveways and parking areas that are disturbed or damaged by the Contractor's operations shall be restored equal to a new condition.
 2. Driveway or parking area aprons which do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1 inch per foot with top course material of the new pavement, so that the apron conforms to the elevation of the road pavement at each location.

3. New driveways or parking areas shall be constructed as described herein and as shown on the Drawings.
- D. Road shoulders to be constructed or reconstructed as described herein and as shown on the Drawings.
1. Road shoulders that are disturbed or damaged by the Contractor's operations shall be restored equal to, or to conditions superior to that which existed prior to construction.
 2. Road shoulders that do not meet the elevation of the edge of new road pavement installed under this project shall be adjusted to meet the new pavement at a slope not to exceed 1-1/2 inches per foot. Paving materials shall match existing unless otherwise shown on the Drawings.
 3. New road shoulders shall be constructed as described herein and as shown on the Drawings.

3.02. PREPARATION

- A. Where project consists of reconstructing existing streets, lower valve boxes and existing manholes to subgrade level by removing frame and cover and brick masonry.
1. Cover valve boxes and manholes with steel plates and locate with measured ties.
 2. After constructing the subbases and pavement courses, and prior to placing the final top course, recover valve boxes and manholes and raise to finished grade.
- B. All existing and new manholes, frames and covers, valve boxes, curb boxes, etc., shall be raised or lowered to be 1/2 inch below the new pavement grade.
1. No manhole covers or valve box covers shall be covered with paving material, or be exposed in a depression in the pavement greater than 1/2 inch.
- C. Catch basin frames and grates shall be raised or lowered to be 1 inch below the new pavement finished grade.
- D. Pavement Cuts
1. Pavement cuts for final pavement replacement shall be made as described herein and in Section 02112, Pavement Cutting.
 2. Pavement cuts shall be made parallel to the centerline of the trench, shall be located a minimum of 12 inches outside the backfilled trench on undisturbed subgrade and shall be in a straight line for minimum length of 100 feet between manholes or between those stations where changes in direction of the installed piping were made.
 3. Where a full street width overlay is to be installed the cutbacks may follow the backfilled trench alignment.
 4. Loose, torn, cut, marked up or damaged pavement outside the cutback areas shall be removed and replaced at the Contractor's expense and match the proposed permanent paving.

5. Pavement cuts in driveways shall be cut back 12 inches and made in a straight alignment perpendicular or parallel to the driveway and for its full width.
6. Pavement cuts in parking areas shall be cut back 12 inches and made in a straight alignment parallel to the centerline of trench.

E. Preparation of Existing Surfaces

1. Prior to placing of asphalt concrete, the existing pavement surfaces shall be cleaned including brooming, mechanical sweeping, and flushing with water such that no dust or foreign material remains on the existing surface and in accordance with NYSDOT Specification "401-3.07 Conditioning of Existing Surface" and "633 3.01 Cleaning Existing Pavement and/or Shoulders."
2. After cleaning of surface, all unsealed or inadequately sealed cracks and joints shall be cleaned with compressed air and then sealed as required under NYSDOT Specification "633-3.02 Cleaning, Sealing and Filling Joints and Cracks."
3. Prior to placing of asphalt concrete, vertical faces of existing pavement, structures, curbs and gutters shall receive a tack coat as described in NYSDOT Specification "407 Tack Coat." Curbs and gutter faces to be sprayed only to the extent to be covered by the asphalt concrete.

F. All new pavement where meeting existing pavement shall be butted up against a vertical face in the existing pavement.

1. This vertical face to be cut to the depth of the new pavement.
2. Where the new pavement is an overlay, the beginning and end of the top course shall be similarly butted against a vertical face.
3. The existing pavement shall be removed for a minimum length of 2 feet, as measured parallel to the direction of paving, or greater if required to eliminate any noticeable bump or to provide adequate drainage away from structures, and to the width of new pavement.

G. Removal of Existing Pavement

1. Where shown on the Contract Drawings, the Contractor shall remove a portion of an existing pavement including Portland cement concrete paving, asphalt concrete pavement, or to remove an asphalt concrete overlay pavement from a Portland cement concrete pavement base course, to the limits and profile specified by grinding, milling, or planing methods.
2. This process shall yield a base upon which a final pavement course will be applied.
3. The Contractor shall employ equipment especially designed and manufactured for the grinding, milling or planing of pavements.

4. In general, grinding machines are designed for removing and profiling Portland Cement concrete pavement surfaces while milling and planing machines are designed for the removing of asphalt concrete pavement surfaces.
- H. The resulting ground, milled or planed surface shall be thoroughly cleaned and free from dust, loose pavement material or other material.
1. The surface shall be free from gouges, large cracks and unsound, soft or broken-up areas.
 2. Gouges shall be made level and true by the use of a trueing and leveling course of asphalt concrete if allowed by the Engineer.
 3. Cracks greater than 1/4-inch shall be cleaned and filled in accordance with Article 3.02.
 4. Unsound, soft or broken-up areas shall be excavated and repaired in accordance with Section 02576, Pavement Patching, of these specifications.

3.03. PREPARATION - TACK COAT

- A. Apply tack coat in accordance with manufacturer's instructions
1. Tack coat temperature to be not less than 120 degrees F.
 2. The tack coat shall be applied no more than four hours prior to paving of the asphalt concrete course.
 - a. No traffic will be allowed on the freshly applied tack coat.
- B. Apply tack coat to contact surfaces of curbs, gutters, and existing vertical surfaces.

3.04. PREPARATION - RESET MANHOLE FRAMES

- A. Prior to placing wearing (top) course, make final adjustments of manhole frames, catch basin frames, valve boxes and any other utility structures located in the pavement in relation to finished grade.
1. Manhole frames, valve boxes, etc. to set 1/2 inch below finished grade and parallel to finished crown.
 2. Catch basin frames to set 1 inch below finished grade and parallel to finished crown.
 - a. Bevel slope of wearing course (for 6-inch width) around catch basin frame.

3.05. INSTALLATION

- A. Install work in accordance with NYSDOT standards.
- B. Place asphalt within four hours of applying tack coat.

- C. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact with vibratory pans and hand tamps in area inaccessible to rolling equipment.
- D. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.06. PLACING AND COMPACTING

- A. Placing mix in an appropriate ambient temperature and on a surface sufficiently warm to minimize the risk of excessive cooling before completion of rolling is of paramount importance. Holding the aggregate particles in place is solely the function of the film of asphalt. The asphalt cannot perform this function properly if the mix is too cool when rolled.
 - 1. A thin course compresses very little under the roller and, as it cools quickly, it must be rolled as soon as possible.
 - 2. The Contractor shall supply sufficient number of rollers to perform the required compaction while asphalt concrete is still hot and in a workable condition and coordinate speed of paver with rollers such that the degree of compaction required is obtained.
 - 3. A high degree of densification is not the goal with this type of mix -- the aim is firm seating and contact of the aggregate particles.
 - 4. One or two coverages (see Table 1) with a steel-wheeled roller weighing 8 to 10 tons is sufficient. Additional rolling may be excessive, causing a break in the bond of asphalt between aggregate particles, particularly after the mix has cooled.
 - 5. When overtaken by sudden storms, the Engineer may permit work to continue up to the amount which may be in transit from the plant at the time, provided the mixture is within temperature limits specified.
- B. Paving (NYSDOT) - All asphalt concrete shall be installed using self-powered units in accordance with the NYSDOT Specification "401-3.05 Bituminous Pavers and 401-3.11 Spreading and Finishing", except that the sixth paragraph of 401-3.11 beginning with the words "If there are less than 1500 square yards. . ." is deleted and the following substituted:
 - 1. A self-powered paving unit shall be provided except where hand methods are permitted by the Engineer in small areas or areas inaccessible to a paving unit. For such areas, the mixture shall be dumped, spread, screened and compacted to give the required section and compaction thickness.
 - 2. Surface Treatment (NYSDOT) - Bituminous surface treatment to be constructed in accordance with NYSDOT "Section 410 Bituminous Surface Treatment - Single Course", Paragraphs 410-1 through 410-3.01 G.
- C. Compaction - Asphalt concrete shall be compacted in accordance with NYSDOT Specification "401-3.12 Compaction and 401-3.13 Joints" using either option as follows:
 - 1. Option A - Tandem roller (static or vibratory) 8 to 10 ton size.

2. Option B - Vibratory compaction.

- D. The required number of passes for either vibratory or static rollers, listed in Table 1, are minimum and may be increased by the Engineer. One pass shall be defined as one movement of the roller over any point of the pavement in either direction. Static roller passes shall continue until all ruts, ridges, roller marks or other irregularities are removed from the surface. The Engineer may alter the compaction procedures for small areas where the specified procedures are not practical.

TABLE 1
REQUIRED NUMBER OF PASSES (MINIMUM)

Pavement Courses	Vibratory Roller		Steel-Wheel Tandem Finish Roller
	Vibrating Passes⁽¹⁾	Static Passes⁽²⁾	Static Passes
Base (open graded each lift)	4	2	5
Base (dense graded)	4	2	5
Binder (dense graded)	4	Not required	5
Top (dense graded all types)	2	Not required	2

⁽¹⁾ The required number of vibrating passes shall be reduced by one half (1/2) for dual vibrating drum rollers when the drums are tandem and are both in the vibrating mode.

⁽²⁾ The required number of static passes may be completed by the vibratory roller operating in the static mode.

- E. Unless otherwise directed by the Engineer, vibratory rollers having pneumatic drive wheels shall compact the longitudinal joint by using one of the pneumatic drive wheels to overlap the joint in two passes with the drum operating static. Unless otherwise directed by the Engineer, dual vibrating drum rollers shall compact the joint by overlapping the joints in two passes with both drums operating static.
- F. To prevent adhesion of the mixture to the drum(s), the drum(s) shall be kept properly moistened with water, or water mixed with small quantities of detergent or other Department approved materials. If required to prevent pneumatic tire pickup, the pneumatic drive wheels may be coated with a fine mist spray of fuel oil or other similar material. In all instances, the surface of the pavement shall be protected from drippings of fuel oil or any other solvents used in pavings, compaction or cleaning operations.
- G. If the Engineer determines that unsatisfactory compaction is being obtained or damage to highway components and/or adjacent property is occurring using vibratory compaction equipment, the Contractor shall immediately cease using this equipment and proceed with the work in accordance with the conventional static compaction procedures at no additional cost.

The Contractor should note that if he elects to use vibratory compaction equipment, he assumes full responsibility for the cost of repairing all damage that may occur to highway components and adjacent property or underground utilities.

3.07. DRIVEWAYS AND PARKING AREAS

- A. Paving materials, type of paving, depth of various courses, etc., shall be as shown on the Drawings.
 - 1. The driveways and parking areas shall be cut back 12 inches from outside disturbed or damaged areas as described above and in Section 02112, Pavement Cutting.
 - 2. The work shall include proper compaction of any necessary subbase, base course and paving courses, in accordance with Section 02228, Compaction.

3.08. TOLERANCES

- A. Surface Tolerance - The pavement surface shall be constructed to a 1/4-inch tolerance. If, in the opinion of the Engineer, the pavement surface is not being constructed or has not been constructed to this tolerance based upon visual observation or upon riding quality, he may test the surface with a 16-foot straight edge (furnished by the Contractor) or string line placed parallel to the centerline of the pavement and with a 10-foot straight edge or string line placed transversely to the centerline of the pavement on any portion of the pavement.
 - 1. Variations exceeding 1/4-inch shall be satisfactorily corrected or the pavement relayed at no additional cost as ordered by the Engineer.
- B. Thickness Tolerance - The thickness indicated for each of the various courses of bituminous pavement is the nominal thickness. The pavement shall be so constructed that the final compacted thickness is as near to the nominal thickness as is practical, and within the tolerances specified below.
 - 1. Material which is part of a trueing or leveling course or shim course will not be considered in pavement thickness determinations.
 - 2. A tolerance not to exceed 1/4-inch from the nominal thickness required for the course specified under one pay item will be acceptable where the required nominal thickness is 4 inches or less. A tolerance not to exceed 1/2-inch from the nominal thickness required for the course or courses specified under one pay item will be acceptable where the required nominal thickness is over 4 inches. In addition, the sum total thickness of all bituminous mixture courses shall not vary from the total of the nominal thickness indicated on the plans by more than 1/4 inch where the total nominal thickness is 4 inches or less; or more than 1/2-inch where the total nominal thickness is over 4 inches but not more than 8 inches; and by not more than 5/8-inch where the total nominal thickness is more than 8 inches.

3.09. FIELD QUALITY CONTROL

- A. The required degree of compaction for wearing or top courses and shim course is a finished product having not more than 7 percent air voids.
- B. The Engineer reserves the right to order testing of materials at any time during the work. The Contractor shall provide testing at no additional cost to the Owner.

3.10. PROTECTION

- A. Any pavement, constructed or reconstructed, which is subsequently damaged due to activity of work under this contract, shall be removed and replaced by the Contractor at no additional cost to the Owner.
- B. Protect pavement from vehicular traffic until compaction is completed.

END OF SECTION

SECTION 02576

PAVEMENT PATCHING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Bituminous pavement patching.
- B. Concrete pavement patching.
- C. Compaction.
- D. Testing.

1.02. REFERENCES

- A. New York State Department of Transportation Standard Specifications dated January 2, 1990.
- B. NYSDOT - Manual of Uniform Traffic Devices.

1.03. SUBMITTALS

- A. Refer to Section 02510, Asphalt Paving.

1.04. ENVIRONMENTAL LIMITATIONS

- A. Patching to be performed only when temperature and weather meet the requirements as described in Section 02510, Asphalt Paving.

1.05. SCHEDULING

- A. Schedule patching work in coordination with local authorities having jurisdiction over the site.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Refer to Section 02223, Backfilling and Section 02229, Pavement Subgrade, for pavement backfill and subgrade requirements.
- B. Refer to Section 02510, Asphalt Paving, for description of bituminous material for patching.
 - 1. Patches up to 2 inches deep install wearing course asphalt concrete.

2. Patches over 2 inches deep use a combination of courses of base, binder and wearing course as approved by the Engineer.
- C. Provide asphalt emulsion for tack coating of existing edges of patch.

PART 3 EXECUTION

3.01. EXAMINATION

- A. All bituminous pavement patching shall be done with asphalt concrete material matching existing pavement.

3.02. PREPARATION

- A. Prior to all patching, the affected area shall be cut out as per Section 02112, Pavement Cutting, in a rectangular or square shaped manner.
1. Cutting and removal of existing material to extend 12 inches outside the affected area.
 2. Two sides of the area shall be at right angles to the direction of traffic.
 3. All material within the cut-out area to be removed down to a firm subgrade and disposed off site as surplus material.
 4. The surface area to be cleaned of all partially weathered or disturbed material and compacted to provide a clean hard foundation and clean interface between patch and existing pavement.

3.03. INSTALLATION

- A. Subbase shall be brought to grade with specified base material.
1. For bituminous patching a tack coat shall be applied to the vertical faces of the existing pavement prior to placing asphalt material. Refer to Section 02510, Asphalt Paving.
- B. A bituminous (asphalt concrete) patch shall then be applied to a depth equal to the original bituminous material, but not less than two courses of 1-1/2 inches each (material to be placed against the edges of the hole first).
1. Avoid pulling material from center of patch to the edges, instead if more material is needed at the edge, it should be deposited there, and the excess raked away.
 2. Sufficient material should be used to ensure that after compaction, the patched surface will be at the correct grade and slope, slightly higher than the adjacent pavement, and not below the adjacent pavement.
 3. Each course shall be thoroughly compacted by the use of mechanical tampers, vibratory plate compactors and hand tampers for small areas and roller for large areas.

3.04. TOLERANCES

- A. After completion of patching, the Contractor shall check smoothness with straight edge or stringline. Deviations of 1/8 inch or more shall be corrected.

END OF SECTION

SECTION 02661

WATER DISTRIBUTION PIPING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Water main piping including fittings, accessories and materials.
- B. Connection of water mains to existing piping, hydrants, valves, and meters.
- C. Water services to serve domestic or fire protection.
- D. Installation.
- E. Installation schedule.
- F. Pressure Testing of Water Distribution Piping

1.02. REFERENCES

American National Standard Institute (ANSI) American Water Works Association (AWWA)

American Society for Testing Materials (ASTM)

- A. Copper Pipe and Tubing

ASTM B88	Copper Pipe Type K
AWWA C800	Underground Service Line Valves and Fittings (with Type K Copper Pipe and Tubing)

1.03. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data - Provide data describing conformance to ANSI/AWWA/ASTM codes, materials, sizes, class, dimensions, joint type, fittings, and pipe accessories.
- C. Manufacturer's Installation Instructions - Indicate special procedures required to install products specified.
- D. Results of shop tests, if required.
- E. Manufacturer's Certificate - Certify that products meet or exceed specified requirements.
- F. Submit certifications for iron and steel products in accordance with AIS requirements and Section 01300, Submittals.

1.04. PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700, Closeout and Record Documents.
- B. Submit marked-up record plans, including record location if different from plan, variations in specified depth of more than ± 6 inches, record a minimum of two ties on all hydrants, bends, valves, and service connections.
- C. Identify and locate on record drawings the exposed unmapped utilities or services.

1.05. REGULATORY REQUIREMENTS

- A. Conform to requirements of regulatory agencies having jurisdiction over the work.

1.06. FIELD MEASUREMENTS

- A. Prior to start of construction, verify by field measurements that existing conditions and structures are as shown on Drawings, notify Engineer of specific discrepancies or potential interferences.
- B. Prior to start of construction where ordered, verify by exploratory excavations that existing underground utility locations and elevations are as shown on the Drawings or to confirm marked location and elevation of underground utilities by the organization identified in Section 02205, Protection of Existing Facilities.
- C. Where connections are to be made to existing pipes, confirm the type of material and the outside dimensions of pipes.

1.07. COORDINATION AND SHUTDOWNS

- A. Coordinate field work under provisions of Sections 01039, Coordination and Meetings, and 01500, Temporary Facilities, including field engineering, maintenance of traffic, access to private driveways, and emergency vehicle access.
- B. Coordinate work with local utility companies (private and municipal), including the organization identified in Section 02205, Protection of Existing Facilities, for location of existing utilities and protection thereof.
- C. Coordinate shutdowns of existing systems with local authorities. Notify affected property owners and industries at least 24 hours prior to shutdown including duration of shutdown.

PART 2 PRODUCTS

2.01. COPPER SERVICE PIPE

- A. Copper Pipe - ASTM B88, Type K material for underground service.
- B. Fitting shall be flare-type fittings in conformance with AWWA C800 ANSI B16.26 and shall be lead-free.

- C. Joints - Copper joints shall be thoroughly cleaned and the end of pipe uniformly flared by a suitable tool to the bevel of the fitting used. Wrenches shall be applied to the bodies of the fittings where the joint is being made and, in no case to a joint previously made. Joints shall be made with solder in conformance with ASTM B32.

2.02. PIPE ACCESSORIES

- A. Fittings - Same materials, class, coatings and linings as pipe unless under Article 2.01 it was specifically described otherwise. Fittings molded or formed to suit pipe size and end design and in required tee, bends, elbow, couplings, adapters, and other configurations.
- B. Where piping is to be installed, above ground or within structures provide adequate supports and bracing by means of hangers, brackets or concrete supports as may be required by the location.
- C. Pipe openings in existing walls shall be precast or core drilled and completely sealed against water seepage with a mechanical type seal consisting of interlocking synthetic rubber links and nuts with pressure plates wider at ends, the seal shall be a link seal manufactured by Thunderline Corporation, Wayne, MI, or equal.

2.03. IDENTIFICATION

- A. Each pipe length and fitting shall be clearly marked with:
 - 1. Manufacturer's name and trademark.
 - 2. Nominal pipe size and class.
 - 3. Material designation.

2.04. UNDERGROUND LOCATING TAPE AND TRACER WIRE

- A. Provide detectable locating tape for all underground piping. Locating tape shall be a minimum of 2 inches wide. Tape shall be colored with warning legend describing buried piping.
- B. Install tracer wire along the entire length of the finished underground piping. Terminations shall be provided at all valves, vaults, and manholes.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Contractor shall verify all existing conditions.

- B. The Drawings and specifications may contain information relating to conditions below the ground surface at the site of proposed work, but such information is furnished without guarantee as to it being complete or correct. The Contractor shall assume all risk and responsibilities and shall complete the work in whatever manner and under whatever conditions he may encounter or create without extra cost to the Owner. Location of existing underground facilities at or contiguous to the site is based upon information and data furnished to the Engineer by owners of such underground facilities or others, and Owner and Engineer do not assume responsibility for the accuracy or completeness thereof. The Contractor shall perform exploratory excavations in advance of this work to verify the location, depth, size, and material of existing utilities which may interfere with the work to be performed under this contract. All damage to existing utilities shall be the Contractor's cost to repair or replace.
- C. Verify that trench cut, excavated base and pipe bedding are ready to receive pipe and that excavations and pipe bedding dimensions and elevations are as shown on the Drawings.
- D. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked, and removed from the site of the work. Any pipe or fitting which the Engineer suspects is improper for the job shall be temporarily rejected, marked, and set aside for subsequent investigation to determine its conformity with the specifications.
- E. All pipe fittings and specials shall be carefully inspected in the field before lowering into the trench. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipelining or coatings or specials, as determined by the Engineer, shall be culled out and not installed. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the Contractor at his own expense.

3.02. PREPARATION

- A. The Contractor shall have on the job site with each pipe laying crew, all the proper tools, gauges, pipe cutters, lubricants, etc. to handle, cut and join the pipe.
- B. Flat-bottom trenches of required width shall be excavated to the necessary depth as required and maintained in accordance with Section 02225, Trenching.
- C. Prior to installing the pipe foundation material, trenches shall have all water removed and all work performed in a dry trench.
- D. All pipes, fittings and specials which are to be installed in the open trench excavation shall be properly bedded in a uniformly supported on pipe foundations of the type specified in Section 02225, Trenching, and shown on the Drawings. In particular, stones 2 inches and larger shall be removed from the bearing surface of the pipe foundation.
- E. Compaction methods include hand tamping with T-bars, flat heads, shovel slicing as well as mechanical compactors.
- F. The Contractor shall perform his bedding operations with care to maintain line and grades.

- G. Suitable holes or depressions shall be provided in the pipe bedding to permit adequate bedding of bells, couplings, or similar pipe projections.

3.03. LINES AND GRADES

- A. The Contractor shall furnish all labor, materials, surveying instruments, and tools to establish and maintain all lines and grades. The Contractor shall have personnel on duty or on standbycall, at all times, who are qualified to check line and grade of water mains as they are installed.
- B. Easements, property, and other control lines necessary for locating the work are shown on the Drawings.
- C. During construction, the Contractor shall provide the Engineer, at his request, all reasonable and necessary materials, opportunities, and assistance for setting stakes and making measurements, including the furnishing of one or two rodmen or chainmen as needed at intermittent times.
- D. The Contractor shall carefully preserve bench marks, reference points and stakes established by the Engineer or Owner, and in case of willful or careless destruction by his own operationshe will be charged with the resulting expense to reestablish such destroyed control data and shall be responsible for any mistakes or delay that may be caused by the unnecessary loss or disturbance of such control data.
- E. The Contractor may use laser equipment to assist in setting the pipe provided he can demonstrate satisfactory skill in its use.
- F. The use of string levels, hand levels, carpenter's levels or other relatively crude devices for transferring grade or setting pipe are not to be permitted.

3.04. TOLERANCES

- A. Pipes shall be laid to the lines and grades shown on the Drawings.
- B. Minimum depth of cover shall be maintained as shown on the Drawings or as described herein.

3.05. INSTALLATION

- A. The Contractor shall furnish slings, straps and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from storage areas to the trench shall be restricted to operations which can cause no damaged to the pipe or lining or castings.
- B. The pipe shall not be dropped from trucks onto the ground or into the trench.
- C. Each pipe section shall be placed into position in the trench on the pipe bedding in such manner and by such means required to cause no injury to the pipe, persons or to any property.

- D. The method of laying and jointing the pipe shall be in accordance with the recommendations of the manufacturer and as approved by the Engineer. Each pipe shall be aligned with that already in place, forced home completely with horizontal axial movement and held securely in position. The bell of each pipe length to be laid in the same direction the installation is proceeding.
- E. At the joints, enough depth and width shall be provided to permit the pipe layer to reach entirely around the pipe so that the joints may be made in accordance with the manufacturer's recommendations. Mechanical-type joints shall be tightened within the AWWA recommended torque range.
- F. Pipes, fittings, and specials shall be firmly bedded in the pipe foundation and shall have full bearing throughout their entire length, which shall be accomplished by combination of shaping the bedding and adequately compacting the pipe bedding and backfill under and around the pipe to the spring line of the pipe. The remaining backfill placed in 12-inch lifts to 1-foot above the crown of the pipe in accordance with Table 1, Minimum Compaction Requirements, of Section 02228, Compaction. The remaining backfill installed in accordance with Sections 02225, Trenching, and 02228, Compaction.
- G. When laid in tunnels, pipes shall be blocked in such a manner as to take the weight off the bells. Pipe laid in normal trench excavation shall not be laid on wood blocking.
- H. Backfill material within 12 inches of the pipe shall be free of stones greater than 2 inches in any dimension.
- I. Unless otherwise shown on the Drawings, the minimum total finished cover over the top of the pipe barrel of all pressure pipe shall be 5 feet.
- J. Refer to Section 02225, Trenching, for other installation guidelines and requirements.
- K. To deflect a pipe joint, first join the pipe in the proper manner and then deflect the pipe within the allowable deflection recommended by the manufacturer.
- L. Install detectable locating tape, trace wire, minimum 2 inches wide with the words "Water Line Below" along the centerline of the installed water main for the entire length at a maximum depth of 2 feet 0 inches below finished grade.

3.06. BRACING AND BLOCKING

- A. All bends, tees, crosses, plugs, etc., shall be braced and blocked with wood and then anchored with concrete thrust blocks so that there will be no movement of the pipe in the joints due to the internal or external pressures.
- B. The concrete shall be placed around the fittings and completely fill the space between the fittings and walls of the trench, from 6 inches below the fittings of pipe to 12 inches above the fittings and in accordance with the dimensions and details shown on the Drawings.
- C. The anchor concrete shall be so placed that the bell and spigot joints or other joints may be tightened, if necessary.

- D. Steel ties to be used only where shown on the Drawings.
- E. Prior to installation of the concrete anchor, the Contractor shall wrap all fittings with a minimum of 8-mil thick polyethylene.
- F. Refer to details shown on the Drawings.
- G. Cast-in-place concrete used in constructing concrete thrust blocks shall conform to requirements specified in Section 03300, Cast-in-Place Concrete.
- H. Measuring, mixing, transporting and placing of concrete shall conform to American Concrete Institute (ACI) Publication 304.
- I. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- J. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.07. TEMPORARY PLUGGING

- A. At all times when pipe laying is not actually in progress, the open ends of the pipes shall be closed temporarily with pipe plugs or by other means such that there is no possibility of any water or foreign material entering the line. If water is in the trench when work is resumed, the plugs shall not be removed until the water has been removed and work can proceed in a dry stable trench.

3.08. CLEANING PIPELINE

- A. At the conclusion of the work, the Contractor shall thoroughly clean all new pipes by flushing with water or other means to remove all dirt, stones, pieces of wood, etc., which may have entered during the construction period.
 - 1. Pipes shall be flushed at a minimum rate of 2.5 feet per second for a suitable duration.
 - 2. If, after this cleaning, any obstructions remain, they shall be corrected to the satisfaction of the Engineer.
- B. Where required, the Contractor shall use mechanical methods to clean pipes when flushing does not remove all obstructions or material.

3.10. PRESSURE TESTING AND FLUSHING

- A. Test Requirements
 - 1. All water mains shall be tested in accordance with AWWA Standard C600. The following procedure shall be used:

- a) All newly laid pipe or any valved section thereof, shall be subjected to a hydrostatic pressure 50 percent in excess of the working pressure at any point on the section being tested, but in no case less than 150 lbs. per square inch for a period of 2 hours.
 - b) The Contractor shall accomplish the required tests on the pipeline by individually testing each component section of the installed main. The maximum length of section permitted to be tested at any one time will be approximately one mile, and normally will be less.
2. Test Pressure Restrictions - Test pressure shall:
- a) Not be less than 150 psi at the highest point along the test section.
 - b) Not exceed pipe or thrust restraint design pressures.
 - c) Be of at least two-hour duration.
 - d) Not vary by more than ± 5 psi.
 - e) Not exceed twice the rated pressure of the valves when the pressure boundary of the test section includes closed gate valves.
3. Leakage Test
- a) All leakage test shall be conducted concurrently with the pressure test.
 - b) Leakage Defined - Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure throughout the duration of the test after the pipe has been filled with water.
 - c) The rate of leakage shall not exceed 11.65 gallons per day, per mile of pipe, per inch of nominal pipe diameter based on a test pressure of 150 psi. For the allowable leakage in gallons per hour (gph) for other test pressures refer to Table 4.A of AWWA C600, a copy of which is at the end of this section, including the basic formula for calculating the allowable leakage.

B. PROJECT RECORD DOCUMENTS

- 1. Submit documents under provisions of Section 01700, Closeout and Record Documents.
- 2. Submit completed form (attached to the end of this section) for flushing and testing of water mains.

C. REGULATORY REQUIREMENTS

- 1. Submit proof of testing as required by local, county, or state agencies.

D. FIELD MEASUREMENTS

1. Measure length of test section.
2. Measure quantity of water used to maintain test pressure during test period.

E. COORDINATION

1. Provide 48-hour notice to the Owner of local water department when water for flushing, testing and disinfection is required.
2. Owner of existing water system to operate all valves and hydrants unless Contractor has been specifically authorized to operate systems valves and hydrants by Owner.

F. WATER SUPPLY

1. Contractor shall supply water for flushing and disinfection from clean, clear potable sources acceptable to the Engineer.
2. All water for flushing and disinfection shall be furnished and disposed of in accordance with all federal, state, and local requirements by the Contractor at his expense.

G. EXAMINATION

1. Backfilling of the water main trench to ground surface or road surface shall be in place and completed except for final paving for seven calendar days or as approved by the Engineer prior to start of testing of each section of water main.

H. PREPARATION

1. The Contractor shall supply all plugs, pumps, weirs, gauges, etc., necessary to conduct the tests, including means to accurately measure the quantity of water used to maintain test pressure during the test period.
2. Flush all piping systems with water prior to testing.

I. TESTING

1. Pressure and leakage tests shall be conducted on all water main pipes.
2. The Engineer shall witness all tests.
3. All test results shall be recorded on form attached at the end of this section.
4. Pressurization - Each valved section of pipe shall be filled with water slowly and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe.
5. Air Removal - Before applying the specified test pressure, air shall be expelled completely from the pipe and valves.

6. Examination - All exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, or valves that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated.
7. All visible leaks, regardless of the amount, shall be repaired.
8. If the section being tested fails to pass the pressure or leakage test, the Contractor shall determine the source or sources of leakage, and he shall permanently repair or replace all defective materials and/or workmanship at his own expense. The extent and type of repair as well as results, shall be subject to the approval of the Engineer. The completed pipe installation shall then be retested and required to meet the pressure and leakage requirements of the test.
9. Testing and retesting shall be completed prior to final paving and prior to disinfection of the water main system.

J. WATER SERVICES

1. Water services to be installed after completion of disinfection of the water mains.
2. Services to be tested, prior to backfilling by flushing the service pipe thoroughly and by observing for any leaks along the pipe, or at corporation and curb stops.

(continued)

INSTALLATION OF DUCTILE-IRON MAINS AND THEIR APPURTENANCES

Table 4.A Hydrostatic testing allowance per 1,000 ft of pipeline*—*gpb*†

Avg. Test Pressure	Nominal Pipe Diameter— <i>in.</i>																	
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	64
450	0.43	0.57	0.86	1.15	1.43	1.72	2.01	2.29	2.58	2.87	3.44	4.30	5.16	6.02	6.88	7.74	8.60	9.17
400	0.41	0.54	0.81	1.08	1.35	1.62	1.89	2.16	2.43	2.70	3.24	4.05	4.86	5.68	6.49	7.30	8.11	8.65
350	0.38	0.51	0.76	1.01	1.26	1.52	1.77	2.02	2.28	2.53	3.03	3.79	4.55	5.31	6.07	6.83	7.58	8.09
300	0.35	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21	4.92	5.62	6.32	7.02	7.49
275	0.34	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.03	4.71	5.38	6.05	6.72	7.17
250	0.32	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85	4.49	5.13	5.77	6.41	6.84
225	0.30	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65	4.26	4.86	5.47	6.08	6.49
200	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44	4.01	4.59	5.16	5.73	6.12
175	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22	3.75	4.29	4.83	5.36	5.72
150	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98	3.48	3.97	4.47	4.97	5.30
125	0.23	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72	3.17	3.63	4.08	4.53	4.83
100	0.20	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43	2.84	3.24	3.65	4.05	4.32

*If the pipeline under test contains sections of various diameters, the testing allowance will be the sum of the testing allowance for each size.

†Calculated on the basis of Eq 1.

FLUSHING AND TESTING OF WATER LINES TABULATION SHEET

Job No.: _____ Location _____

Contract No. _____ Contractor: _____

Project: _____

FLUSHING

Date _____ Weather _____ Temperature _____

Section Flushed _____ feet of _____-inch diameter pipe

Line Flushed _____ hours _____ minutes @ _____ gal/min

Line Flushed Through _____

Method of Measuring Flow _____

PRESSURE AND LEAKAGE TESTING

Date _____ Weather _____ Temperature _____

Section Tested _____ ft. of _____-inch diameter _____ pipe in _____-ft. laying lengths

Time Started _____ Time Finished _____ Elapsed Time _____

Test Pressure: Start _____ psi Finish _____ psi

Allowable leakage, as calculated _____ gallons

Actual leakage _____ gallons

Pass ____ Fail ____

$$L = \frac{SD \sqrt{P}}{133,200^*}$$

where:

L = Allowable leakage in gallons/hour
S = Length of pipe tested (linear feet)
D = Nominal diameter of pipe (inches)
P = Average pressure during test, psi

*Refer to C600 for additional allowance leakage against closed metal-seated valves.

Owner's Representative _____

Contractor's Representative _____

END OF SECTION

SECTION 02662

WATER SUPPLY WELL

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Remove existing well pump, piping, appurtenances and pitless adapter. Furnish, install, and test a new well pump, piping, pitless adapter and controls. The complete system will include a well pump with motors, variable frequency drive (VFD), pressure transducer and pressure switch and all other required accessories in accordance with the Contract Documents.

1.02. REFERENCES

- A. Hydraulic Institute Standards - Latest Edition
- B. AWWA A100 Standards for Water Wells
- C. ANSI
- D. ASTM A53/A53M – Standard Specifications for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- E. UL
- F. ISO
- G. NEMA
- H. ETL
- I. CSA
- J. NEC
- K. IEC
- L. NSF

1.03. PERFORMANCE REQUIREMENTS

- A. All components of the plant water pumping system, including motor, variable speed drive, pressure transducer, pressure switch and accessories shall be furnished by a single equipment supplier who shall be responsible for the proper functioning of the entire system in compliance with this equipment specification.
- B. The well pump, including motor and VFD controllers, shall be suitable for continuous operation throughout the specified flow conditions without damage or overheating.
- C. The well pump system shall be capable of performing to the following conditions.

Pump Type	Submersible Multi-Stage Groundwater Pump
Pump Capacity	40 gpm @ 240-ft TDH
Pump Diameter	4-in
Pump Discharge	2-in NPT
Motor	5HP 460V, 3 ph, 60 HZ, 3450 rpm
Drive	Rated 7.5 HP, 460V, 13 Amp
Enclosure	NEMA 12

1.04. SUBMITTALS

- A. Provide in accordance with Sections 013300, Submittals; 016400, Equipment-General; and as supplemented herein. Submittals shall include, but not be limited to, the following:
 - 1. Shop Drawings - Shop drawing submittal shall include detailed information the well pump, pump controller, including operating characteristics, nameplate data, maximum recommended starts per hour, wiring diagrams showing power and control wiring terminal connections with wiring identification and color coding, junction box sizing for power and control wiring connections, accessories, supports, connections, outlets, and related piping.
 - 2. Certified performance curves for the specified design conditions.
 - 3. Performance affidavits.
 - 4. Shop test results.
 - 5. Manufacturer's Installation Certificate.
 - 6. Certification of equipment compliance.
 - 7. Field test reports.
 - 8. Training plans.
 - 9. Recordings of training.
 - 10. Training reports
 - 11. Manufacturer's equipment warranty – 24 months from date of system startup.
 - 12. Manufacturer's instructions and/or operation and maintenance manual.
 - 13. Training video recordings.
- B. Provide operation and maintenance manuals and data where scheduled in Section 016400, Equipment-General.
- C. Submit certifications for iron and steel products in accordance with AIS requirements and Section 013300, Submittals.

1.05. EQUIPMENT WARRANTIES AND SPECIAL GUARANTEES

- A. The supplier shall provide the following warranties and special guarantees in accordance with Section 016400, Equipment-General.

1. The equipment manufacturer shall guarantee for a period of three years starting at the time of equipment delivery to the job site or one year starting at the time of Substantial Completion (whichever is shorter), that the equipment supplied is free from defects in materials or workmanship and will meet the specified performance requirements when operated in accordance with the manufacturer's recommendations. The manufacturer shall correct any breach in this warranty at their expense.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. The well pump and pump control manufacturer shall be the following or approved equal:
 1. Grundfos.

2.02. EQUIPMENT DESIGN

- A. Well Pump
 1. The pump shall be a multi-stage submersible pump for raw water supply.
 2. Pump Material: Stainless Steel AISI 304
 3. Impeller Material: Stainless Steel AISI 304
 4. Motor Casing: Stainless Steel AISI 304

2.03 ACCESSORIES

- A. A pressure transducer shall be factory installed on the discharge manifold (or field installed as specified on plans). Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be +/- 1.0% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32 VDC.
- B. A bourdon tube pressure gauge, 2.5-inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless-steel case. Gauge accuracy shall be 2-1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
- C. An adjustable pressure switch shall be installed pipe manifold for the hydropneumatics pump. All wetted parts shall be of stainless steel. The pump shut-down pressure shall be 3 psig with a reset pressure of 5 psig. A normally open dry contact shall be provided on the VFD/Motor for field installation.
- D. The system shall include a factory installed service disconnect switch mounted in a lockable NEMA 4 enclosure.

2.03. CONTROLS

- A. The pump system controller (Proportional-Integral) shall be a standard component of the integrated variable frequency drive motor developed and supported by the pump manufacturer.
- B. The pump system controller shall have an easy to use interface mounted on the VFD/motor enclosure. Pump system start/stop and set-point adjustment shall be possible through the use of two push buttons located on the drive enclosure.
- C. The VFD/motor shall be capable of receiving a remote analog set-point (4-20mA or 0-10 VDC) as well as a remote on/off (digital) signal.
- D. Pump status and alarm state shall be indicated via two LED lights located on the VFD/motor enclosure. Programming and troubleshooting shall be possible via an infra-red hand held programmer or a field connected personal computer. Pump system programming (field adjustable) shall include as a minimum the following:
 - 1. System Pressure set-point, psig
 - 2. System start pressure, psi
 - 3. System Stop pressure, psi
 - 4. Minimum Pump Speed,
 - 5. Pressure Transducer supply/range
 - 6. Maximum Pump Speed, %
 - 7. System Time (Proportional Gain)
 - 8. Integral Action Time
- E. Programming/Communications
 - 1. The system controller shall monitor the discharge pressure for the pumpingsystem transmitted from the pressure indicating transmitter.
 - 2. The VFD's shall be capable of transmitting all system operational data, including equipment run status and speed and alarm conditions via hardwired signals to the Chemical Building PLC.

2.04. FABRICATION REQUIREMENTS

- A. Shop coat per manufacturer's standard finish system and color.
- B. All bolts, nuts, washers, and other fasteners shall be Type 304 stainless steel unless otherwise noted.
- C. Welds shall be continuous unless noted otherwise.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

- E. Furnish nameplates for each equipment.
 - 1. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins.
 - 2. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the equipment performance ratings.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- B. No modifications to equipment shall be made without the written consent of the manufacturer and approval of Engineer.
- C. Field verify all dimensions and elevations. Notify Engineer of specific differences.
- D. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for testing and startup.
- E. Surface preparation and field painting shall be in accordance with Division 9 specifications.
- F. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- G. Anchor rods (bolts) shall be Type 316 SS HILTI-style adhesive anchors.
- H. Backpaint aluminum in contact with painted or galvanized steel or concrete with 5 mil of Tnemec Series 66-Gray, Hi-Build Epoxoline or DuPont 25P Epoxy.
- I. Isolate dissimilar metals by backpainting or with dielectric using stainless steel fasteners.

3.02. TESTING AND STARTUP

- A. Testing and startup shall be performed in accordance with Sections 016400, Equipment-General; 017500, Starting of Systems; and as specified herein unless otherwise noted.
- B. The well pump system manufacturer shall provide manufacturer's services at the jobsite at no additional cost to the Owner. One full 8-hour day of service from manufacturer's representative shall be provided to approve installation and advise the Contractor during startup, testing, and final adjustment of the system.

3.03. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide services of the equipment manufacturer or their approval representative in accordance with Section 016400, Equipment-General, and as specified herein.

3.04. FAILURE OF EQUIPMENT TO PERFORM

- A. Promptly correct by replacement or otherwise any defects in the equipment, or failure to meet the guarantees or performance requirements.
- B. Upon failure to make these corrections, or if the improved equipment again fails to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of said equipment, may reject said equipment and order it removed from the premises and replaced with new equipment at the manufacturer's expense.

END OF SECTION

SECTION 02810

FENCES AND GATES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Polymer-Coated Fence framework, fabric, and accessories.
- B. Manual gates and related hardware.
- C. Type I and Type II fence materials both are acceptable.

1.02. REFERENCES

- A. ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
- B. ASTM F567 - Installation of Chain Link Fence
- C. ASTM A116 - Zinc Coated (Galvanized) Steel Woven Wire Fence Fabric
- D. ASTM A120 - Pipe, Steel, Black and Hot Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses
- E. ASTM A121 - Zinc Coated (Galvanized) Steel Barbed Wire
- F. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware
- G. ASTM A392 - Zinc Coated Steel Chain Link Fence Fabric
- H. ASTM A428 - Weight of Coating on Aluminum Coated Iron or Steel Articles
- I. ASTM A585 - Aluminum Coated Steel Barbed Wire
- J. ASTM A1011 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
- K. ASTM F668 - Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric

1.03. SYSTEM DESCRIPTION

- A. Nominal Fence Height – 4 feet
- B. Line Post Spacing - At intervals not exceeding 10 feet. Straight runs shall not exceed 500 feet provide corner or pull posts for any change in direction of 15 degrees or more.

1.04. SUBMITTALS

- A. Submit under provisions of Section 013300, Submittals.
- B. Shop Drawings - Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- C. Manufacturer's Product Data - Provide data on fabric, barbed wire, posts, accessories, fittings and hardware.
- D. Certifications for iron and steel products in accordance with AIS requirements.

1.05. PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 017700, Closeout and Record Documents.
- B. Accurately record actual locations of property perimeter posts relative to property lines and easements.

1.06. QUALITY ASSURANCE

- A. Perform work in accordance with manufacturer's instructions.

1.07. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum five years' documented experience.

1.08. FIELD MEASUREMENTS

- A. Field verify that measurements are as indicated on shop drawings and within Owner's property limits, if not notify Engineer immediately.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Fencing
 - 1. Cyclone Fence Division of USX Corporation - Product: Type I.
 - 2. Anchor Fence, Inc. - Product: Type I.
 - 3. Allied Type and Conduit (Fence Division), Harvey, IL; - Product: Type II.
 - 4. Master Halco, Co. - Product: Type II

B. Chain link Swing Gates

1. Master Halco. or equal – Product: Heavy Duty Double Swing Gate

2.02. MATERIALS DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

2.03. MATERIALS

- A. Framework - Type I or Type II steel pipe. Either type may be used for pipe or fabric.

1. Type I - Schedule 40 steel pipe with 1.8 ounces of zinc coating per square foot of surface area conforming to ASTM F1083; or,
2. Type II - Pipe manufactured from steel conforming to ASTM A1011, cold-formed, high frequency or induction welded and having a minimum yield strength of 50,000 psi. External surface triple coated per ASTM F1234, Type B and Type D with 1.0 ounce \pm 0.1 ounce of zinc per square foot, 30 \pm 15 micrograms of chromate per square inch and high performance polymer.
3. All coatings to be applied inside and out after welding.
4. Pipe shall be straight, true to section and conform to the following weights:

Pipe Size Outside Diameter	Type I Weight, lbs./ft	Type II Weight, lbs./ft
1-5/8"	2.27	1.84
2"	2.72	2.28
2-1/2"	3.65	3.12
3"	5.79	4.64
3-1/2"	7.58	5.71
4"	9.11	6.56
6-5/8"	18.97	--

- B. Steel Fabric Wire (Type I) - ASTM A491 aluminum coated wire fabric. 1-inch diamond mesh interwoven wire 9 gage thick, top selvage twisted tight, bottom selvage knuckle and closed, with minimum tensile strength of 80,000 lbs. per square inch.
- C. Fabric (Type II) - Aluminized fabric shall be manufactured in accordance with ASTM A491 and coated before weaving with a minimum of 0.4 ounces of aluminum per square foot of surface area. The steel wire and coating shall conform to ASTM A817. Fabric to be 9 gauge woven in a 1-inch diamond mesh. Top selvage to be twisted and barbed. Bottom selvage to be knuckled.

2.04. COMPONENTS

A. Fence Posts

Fabric Height	Type I and II	
	Line Post O.D.	Corner and Terminal Post O.D.
Under 6'	2"	2-1/2"
6' to 9'	2-1/2"	3"
9' to 12'	3"	4"

B. Gate Posts

Single Gate Width	Double Gate Width	Post O.D. Type I and II
Up to 6'	Up to 12'	3"
7' to 12'	13' to 25'	4"

C. Rails and Braces - 1-5/8 inches O.D.

D. Gates – Fabric to match fence. Gate accessories, hinges, latches, center stops, keepers and necessary hardware of quality required for industrial and commercial application. Latches shall permit padlocking.

E. Fittings

1. Post Caps - Pressed steel (with set screw retainer), cast iron or cast aluminum alloy designed to fit snugly over posts to exclude moisture. Supply cone type caps for terminal posts and loop type for line posts. All fittings to conform to ASTM F626.
2. Rail and Brace Ends - Pressed steel, cast iron or cast aluminum alloy, cup-shaped to receive rail and brace ends.
3. Top Rail Sleeves - Tubular steel, 0.051 thickness x 7 inches long, expansion type.
4. Tension Bars - Steel strip, 5/8-inch wide x 3/16-inch thick.
5. Tension Bands - Pressed steel, 14 gauge thickness x 3/4 inch wide.
6. Brace Bands - Pressed steel, 12 gauge thickness x 3/4 inch wide.
7. Truss Ends - Steel rod, 3/8-inch diameter merchant quality with turnbuckle.
8. Barbed Wire Arms - Pressed steel galvanized, or cast aluminum alloy fitted with clips or slots for attaching three strands of barbed wire. Double arms shall be set outward on a 45-degree angle and be capable of supporting a 250-lb. load at outer barbed wire connecting point without causing permanent deflection.

F. Tension Wire - Marcellled 7 gauge steel wire with minimum coating of 0.80 ounces of zinc or 0.40 ounces of aluminum per square foot of wire surface and conforming to ASTM A824.

- G. Tie Wires - Aluminum, 9 gauge, alloy 1100-H4 or equal.
- H. Hog Rings - Steel wire, 9 gauge, with a minimum zinc coating of 0.80 ounces per square foot of wire surface.
- I. Barb Wire - If required, commercial quality steel, 12-1/2 gauge, two strand twisted line wire with 4 point barbs at 5-inch spacing. Coating shall consist of a minimum of 0.80 ounces of zinc per square foot of wire surface conforming to ASTM A121 or a minimum of 0.30 ounces of aluminum per square foot of wire surface conforming to ASTM A 585.

2.05. ACCESSORIES

- A. Gate Hardware - Center plunger rod, catch, and semi-automatic outer catches to secure gates open in position; two 180-degree ball and socket gate hinges per leaf and hardware for padlock accessible from both sides of gate.

2.06. FINISHES

- A. Components and Fabric - Polymer-Coated Fabric: ASTM F668, Class 1, over zinc-coated steel wire
- B. Hardware - Polymer-Coated. coating.
- C. Accessories - Same finish as framing.
- D. Color: to be a manufacturer's standard, black.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with manufacturer's instructions on previously-prepared surfaces, cleared of obstacles.
- B. Set intermediate, terminal, gate, and corner posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.
- C. Corner, Gate, Line, and Terminal Post Footing Depth Below Finish Grade - As indicated.
 - 1. Where bedrock is encountered, termination into bedrock shall be 12 inches minimum for line posts and 18 inches minimum for gate, pull, and termination posts.
- D. Provide top rail through line post tops and splice with 6 inch long rail sleeves. Top rail and fabric shall closely parallel finish grade without excessive angle changes. Accomplish good visual effects.
- E. Install center and bottom brace rail on corner gate leaves and all terminal posts.

- F. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- G. Position bottom of fabric 1 inch above finished grade.
- H. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- I. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- J. Install bottom tension wire stretched taut between terminal posts. Bottom wires to be within 8 inches of the respective fabric line.
- K. Install support arms sloped outward and attach barbed wire; tension and secure.
- L. Install gate with fabric and barbed wire overhang to match fence. Install two hinges per leaf, latch, catches, drop bolt, foot bolts and sockets, torsion spring retainer and retainer and locking clamp.
- M. Gates to be plumb, level, and secure for full opening without interference. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- N. Brace each gate and corner post to adjacent line post with horizontal center brace rail and 3/8-inch diameter diagonal truss rods. Install brace rail, one bay from end and gate posts.
- O. Compact concrete around posts by tapping or vibrating, then smooth trowel 2 inches above grade, sloped to drain. Posts to remain unburdened or undisturbed for seven days following concrete pour.

3.02. ERECTION TOLERANCES

- A. Maximum Variation From Plumb - 1/4 inch.
- B. Maximum Offset From True Position - 1 inch.
- C. Components shall not infringe adjacent property lines.

3.03. CLEANUP

- A. Remove waste fencing materials and other debris

END OF SECTION

SECTION 02821

ASBESTOS ABATEMENT

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. The limited Hazardous Materials Survey included as Appendix 1 in this Project Manual summarizes sampling undertaken on behalf of Owner. The survey report identifies locations of asbestos-containing materials (ACM) at facilities owned by the X, including the XXThe survey is intended to be a reference and may not be inclusive of all the hazardous materials present at the project facilities.
- B. General Contractor shall provide all labor, materials, equipment, services, and incidentals necessary for safe and lawful demolition, removal, and disposal of all of ACM and associated asbestos-contaminated materials necessary to complete the project work and as specified by the Owner and Engineer. The General Contractor is also required to provide all labor, materials, equipment, services and incidentals necessary for safe and lawful demolition, removal and disposal of all material present at the project facilities that can reasonably be assumed to be ACM or associated asbestos-contaminated materials. At each building, location, or facility where ACM was identified in the survey or identified during the project, all like material belonging to the same construction assembly or serving the same purpose at the building, location, or facility is to be assumed to be ACM and is to be handled as such. The work described in this paragraph may also be referred to herein as the Asbestos Project.
- C. General Contractor shall provide the services of a New York State Department of Labor (NYSDOL) Certified Project Designer to plan the scope, timing, phasing and remediation methods to be utilized on this Asbestos Project.
- D. The General Contractor shall provide the services of an independent testing laboratory to perform air sampling and testing during asbestos abatement and removal work. The laboratory shall not be affiliated with the project Contractors and the asbestos removal subcontractor and shall be approved by the Engineer.
- E. General Contractor shall provide the services of an Asbestos Abatement Contractor licensed by the New York State Department of Labor and employing personnel with current certifications as required to lawfully conduct the abatement work of this Asbestos Project.
- F. The General Contractor is responsible for demolition, removal, and disposal of all hazardous materials. The General Contractor is responsible to coordinate demolition work and sequencing with all other Contractors, the Engineer, and the Owner.

1.02. REFERENCES

- A. Appendix 1
- B. New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR
 - 1. Part 360 Solid Waste Management Facilities.
 - 2. Part 364 Waste Transporter Permits.
 - 3. Part 370 Hazardous Waste Management System-General.
 - 4. Part 371 Identification and Listing of Hazardous Wastes.
 - 5. Part 372 Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities.
 - 6. Part 373 Hazardous Waste Management Facilities.
- C. Occupational Safety and Health Administration (OSHA) – Part 1926, Safety and Health Regulations for Construction, Subpart Z, Toxic and Hazardous Substances, Standard 1926.1101, Asbestos)
- D. U.S. Environmental Protection Agency (USEPA)
 - 1. National Emission Standards for Hazardous Air Pollutants; Asbestos NESHAP Revision; Final Rule.
 - 2. Asbestos Emergency Response Act (AHERA) (40 CFR Part 763, Subpart E).
- E. New York State Department of Labor (NYSDOL): Industrial Code Rule 56 (12 NYCRR Part 56).

1.03. DEFINITIONS

- A. Authorized Personnel - Facility's representative and all other personnel who are authorized officials of any regulating agency, be it state, local, federal or private entity who possess legal authority for enforcement or inspection of the work.
- B. Clearance Criteria - Shall be determined and established by a Certified Asbestos Project Monitor with an independent testing lab employed by the General Contractor, conforming to all standards set forth by all authorities having jurisdiction, mentioned in the references, and issue the certification of cleaning.
- C. Site-Specific Variance - Relief in accordance with Section 30 of the Labor Law from specific sections of Industrial Code Rule 56 for a specific project.
- D. Phase I and II - Asbestos Project phases as defined and subcategorized in ICR 56-2.

1.04. ABBREVIATIONS

- A. American Society for Testing and Materials (ASTM)
- B. Code of Federal Regulations (CFR)
- C. New York State Department of Labor (NYSDOL)
- D. National Institute for Occupational Safety and Health (NIOSH)
- E. Occupational Safety and Health Administration (OSHA)
- F. United States Environmental Protection Agency (USEPA)

1.05. ASBESTOS SITE-SPECIFIC VARIANCE

- A. If a site-specific variance is sought, the application must be submitted by the General Contractor's NYSDOL Certified Asbestos Project Designer within 14 days after contract award. Forward the required forms to the NYSDOL for their action.

1.06. SUBMITTALS

- A. Asbestos Site-Specific Variance Submittals - If a site-specific variance is sought, submit the following:
 - 1. One copy of the completed DOSH-751 and DOSH-465 forms.
 - 2. One copy of the NYSDOL site-specific variance decision.
- B. Quality Control Submittals
 - 1. Notification Compliance Data - Within two days after notification is sent to the regulatory agencies, submit one copy of each notice sent to each regulatory agency (USEPA and NYSDOL).
 - 2. Asbestos Removal Company Data - Name and address of proposed asbestos removal company and abatement contractor license issued by NYSDOL.
 - 3. Asbestos Worker Certification Data - Name and address of proposed asbestos abatement workers and licenses issued by NYSDOL.
 - 4. Work Plan - Submit one copy of the work plan as specified within this section.
 - 5. Waste Transporter Permit - One copy of transporter's current waste transporter permit from NYSDEC (NYS Part 364 Permit).
 - 6. Evidence of Landfill Licensing - Landfill to be used for ACM disposal shall be licensed to receive asbestos waste by NYSDEC (NYS Part 360 Permit) and by USEPA. Out-of-state landfills shall provide licenses from local agencies having jurisdiction.

7. Negative Air Pressure Equipment - Copy of manufacturer and performance data of all units and HEPA filters used.

C. Asbestos Work Closeout Submittals

1. Waste Shipment Records and Disposal Site Receipts - Copy of waste shipment record and disposal site receipt showing that the ACM has been properly disposed.
 - a. Waste shipment record and disposal site receipt must be received within 35 days of the ACM waste leaving the site. If receipts are not received within the specified time period, the Engineer will notify USEPA in writing within 45 days of the ACM waste leaving the site.

D. Work Plan - At the conclusion of the pre-work conference, before the physical abatement work begins, the General Contractor shall prepare a detailed work plan.

1. The work plan shall include, but not be limited to, work procedures, types of equipment, details of equipment used, decontamination unit locations, crew size and credentials, disposal locations, and emergency procedures for fire and medical emergencies and for failure of containment barriers.
2. If a site-specific variance is sought, do not finalize the work plan until the NYSDOL decision is received.
3. The work plan shall be reviewed by the Engineer prior to the commencement of all demolition work.

1.07. CONTRACT CLOSEOUT SUBMITTALS

- A. Daily Log - Submit copy of Project Monitor's daily air sample log and a copy of Asbestos Abatement Contractor's daily log.
- B. Air Monitoring Data - Submit copy of air test results and chain of custody.

1.08. QUALITY ASSURANCE

- A. Regulatory Requirements - Comply with the referenced standards.
- B. Pre-Work Conference - Before the work of this section is scheduled to commence, a conference will be held by the Engineer at the site for the purpose of reviewing the Contract Documents, discussing requirements for the work, and reviewing the work procedures.
 1. The conference shall be attended by the project Contractors, the asbestos removal subcontractor, and the testing laboratory employed by the General Contractor.

1.09. PROJECT CONDITIONS

- A. In addition to the postings required by law, post the following documents at the entrance to the abatement area:
 1. Copy of the printed work plan.

2. Copy of Industrial Code Rule 56.
- B. Shutdown of Air Handling System - Complete the work of this section within the time limitation allowed for shutdown of the air handling system serving the work area.
 1. The air handling system will not be restarted until approval of the air monitoring tests following the last cleaning.
 2. If total shutdown of the system is not acceptable, follow all regulations for local isolation and provision for temporary HVAC as per NYSDOL regulations.
- C. Maintain electric services to those portions of the building and remaining facility not a part of the asbestos abatement work area at all times. Follow all regulations for electric power shutdown exemptions as per NYSDOL regulations.
- D. Do not obstruct any aisle or passageway so as to reduce its required width as an exit.

1.10. HEALTH AND SAFETY

- A. Where in the performance of the work, workers, supervisory personnel or sub-contractors may encounter, disturb, or otherwise function in the immediate vicinity of contaminated items and materials, all personnel shall take appropriate continuous measures as necessary to protect all ancillary building occupants from the potential ACM exposure.
 1. Such measures shall include the procedures and methods described herein and shall be in compliance with all applicable regulations of federal, state and local agencies.

1.11. FIRE PROTECTION, EMERGENCY EGRESS, AND SECURITY

- A. Establish emergency and fire exits from the work area containment. Provide first aid kits and two full sets of protective clothing and respirators for use by qualified emergency personnel outside of the work area.
- B. Provide a logbook throughout the entire term of the project. All persons who enter the regulated abatement work area or enclosure shall sign the logbook. Document any intrusion or incident in the log book.

1.12. PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

- A. Workers must wear personal protective equipment for all projects as per OSHA and NYSDOL regulations. Provide respiratory protection in accordance with OSHA regulation 1910.134 and ANSI Z88.2.
- B. Workers must be trained as per OSHA and NYSDOL requirements, have medical clearance, and must have recently received pulmonary function test (PFT) and respirator fit tested by a trained professional.
 1. A personal air sampling program shall be in place as required by OSHA.
 2. The use of respirators must also follow a complete respiratory protection program as specified by OSHA.

PART 2 PRODUCTS

2.01. DISPOSAL BAGS

- A. Type - Minimum 6 mil thick, black, and preprinted with a "Caution" label.

2.02. EQUIPMENT

- A. Temporary lighting, heating, hot water heating units, ground fault interrupters, and all other equipment on site shall be UL listed.
- B. All electrical equipment shall be in compliance with the National Electric Code, Article 305-Temporary Wiring.

2.03. GLOVE BAGS

- A. Type - Minimum 6 mil thick, clear, fire retardant polyethylene. Select glove bag sizes appropriate for the size and location of the project.

2.04. NEGATIVE AIR PRESSURE UNITS

- A. Type - Local exhaust system, capable of maintaining negative air pressure within the containment, and provides for HEPA filtration of efficiency not less than 99.97 percent with 0.3-micron particles. Equip the unit with filter alarms lights and operation time meter.

2.05. PLASTIC SHEETS

- A. Type - Minimum 6 mil thick, clear, fire retardant polyethylene.

2.06. RESPIRATORS

- A. Complying with 29 CFR 1910.134 (OSHA).

2.07. VACUUM CLEANERS

- A. Type - Vacuums equipped with HEPA filters.

PART 3 EXECUTION

3.01. ACM, PACM, AND SACM HANDLING AND REMOVAL PROCEDURES

- A. Comply with the standards referenced in Part 1 of this section. Remove and properly dispose of all materials and items identified as ACM, PACM, and SACM in Pre-Demolition Asbestos and Hazardous Materials Assessment Reports(s) referenced in Article 4 of the Supplementary Conditions in accordance with this section and all applicable local, state, and federal rules and regulations.

3.02. CLEANUP PROCEDURES

- A. Comply with the standards referenced in Part 1 of this section.

3.03. PROJECT AIR SAMPLING, MONITORING, AND ANALYSIS

- A. Air Sampling and Analysis – The General Contractor shall provide the services of an independent testing laboratory to perform air sample monitoring during asbestos abatement and removal work. The laboratory shall not be affiliated with the project Contractors and the asbestos removal subcontractor and shall be approved by the Engineer. The laboratory shall use the methods described in standards referenced in Part 1 of this section.
 - 1. The equipment, duration, flow rate, calibration of equipment, number and location of samples are as per ICR 56-4.
 - 2. Air sampling technician shall be on site to observe and maintain air sampling equipment for the duration of the air sampling collection.
 - 3. Period of time permitted between completion of air sample collection and receipt of results on the project site shall be equal or less than 48 hours.
- B. If air samples collected outside the regulated work area indicate airborne fiber concentrations at or above 0.01 fibers per cubic centimeter, or the established background level, whichever is greater; work shall stop immediately for inspection of barriers and negative air ventilation systems. Clean up surfaces outside the regulated work area using HEPA filter equipped vacuums and wet cleaning methods. Work methods shall be altered to reduce fiber concentrations to acceptable levels.
- C. Elevated air sample results, if any, along with background and all other air sample results shall be submitted to the Commissioner of appropriate Asbestos Control Bureau within the same business day of receipt of results.

3.04. FINAL CLEANING AND CLEARANCE PROCEDURES

- A. Negative Pressure Ventilation - Negative air pressure machines if used, shall remain in continuous operation during the entire length of the project.
- B. Cleaning and Visual Inspection - After first, second, third cleaning and required waiting/settling and drying periods, perform a final visual inspection.
 - 1. Final clearance air sampling shall commence after the waiting/settling and drying time as per ICR 56 has elapsed.
- C. Project Monitor Visual Inspection – The General Contractor will employ the services of a NYSDOL Certified Asbestos Project Monitor employed by an independent testing laboratory to perform visual inspection as required by ICR 56.
- D. Final Clearance Air Sampling – The General Contractor will employ the services of an independent testing laboratory to perform final air sampling.
 - 1. The laboratory shall use the methods described in standards referenced in Part 1 of this section.
 - 2. The equipment, duration, flow rate, calibration of equipment, number, and location of samples are as per ICR 56-4.

3. If initial post-abatement (clearance air) monitoring results do not comply with the standards referenced in Part 1 of this section, the Contractor shall either re-clean or order a full set of TEM analysis.
 - a. Results of the TEM analysis will be conclusive, and if the results do not comply with the standards referenced in Part 1 of this section, the Contractor shall re-clean and additional full set of air samples will be collected and analyzed until the standards are met.
 - b. All satisfactory PCM clearance air sample results along with background air sample results, if they are greater than or equal to 0.01 fibers per cubic centimeter, shall be submitted to the Commissioner of appropriate Asbestos Control Bureau within two business days of receipt of satisfactory clearance air results.
 - c. All satisfactory TEM results of previously unsatisfactory PCM clearance air sample results, along with the unsatisfactory PCM results shall be submitted to the Commissioner of appropriate Asbestos Control Bureau within two business days of receipt of satisfactory clearance air results.
4. Prior to removal of isolation barriers, the Engineer at the site will receive an affidavit from the air monitoring laboratory certifying the final air samples comply with the standards referenced in Part 1 of this section.

E. Dismantling of Regulated Abatement Work Area

1. Remove all tools and equipment after proper decontamination as per Part 1 of this section.
2. Dismantle and remove each tent enclosure and air lock and any barriers only after final clearance air monitoring has been performed and satisfactory results obtained.
3. All remaining polyethylene, duct tape, expandable foam and other barrier materials shall be bagged, wrapped, containerized and labeled as asbestos waste.
4. Remove all temporary hard walled barriers from site.
5. Dismantle any remote decontamination units and plastic sheeting shall be disposed as asbestos waste.
6. Remove all waste generated to the holding area, lockable trailer or dumpster.
7. Contractor's Supervisor shall certify in writing to the Engineer that abatement work is complete and no debris/residue remains.

3.05. DISPOSAL OF ACM AND RELATED DEBRIS

- A. Remove all waste generated as part of the asbestos project from the project site within 10 calendar days from the site after completion of abatement or within 1 day of the waste disposal container/trailer becomes full, whichever occurs first.

- B. Transport and dispose of all the asbestos-containing waste, related debris, and wastewater to the approved disposal site.
- C. All generated waste removed from the site must be documented, accounted for and disposed of in compliance with the requirements of USEPA NESHAP.
- D. Comply also with the standards referenced in Part 1 of this section.

3.06. RESTORATION

- A. Remove temporary decontamination facilities and restore area designated for these facilities to its original condition or better.
- B. Where existing work is damaged or contaminated, restore work to its original condition or better.
- C. Where existing property is damaged or contaminated, replace the property to its original condition or better.

END OF SECTION

SECTION 02833

REMOVAL AND DISPOSAL OF MATERIAL CONTAINING LEAD

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. The Limited Hazardous Materials Survey (Survey) included as Appendix 1 in this Project Manual summarizes sampling undertaken on behalf of Owner. Contractor is to provide all labor, materials, equipment, services, and incidentals necessary for the removal of lead-based paints (LBP) as required to permit the safe and lawful demolition, removal and disposal of the equipment, piping, conduit and other items scheduled for demolition as shown on the Drawings or as specified. The survey is intended to be a reference and other LBP may be present at the project facilities.
- B. Where equipment, piping, or building components such as doors or door frames are noted to contain LBP by the survey or identified during the project, it shall be assumed to be the complete piece of equipment, entire run of pipe, or complete building component.
- C. Contractor is to provide all containment, environmental monitoring, laboratory testing, personnel protection, medical monitoring and other measures necessary to perform the work in accordance with all applicable federal, state and local regulations.
- D. All work related to this section, including but not limited to, environmental protection, worker protection, and hazardous waste disposal, shall be in strict compliance with all applicable federal, state and local laws, codes, rules and regulations.
- E. The General Contractor is responsible for demolition, removal, and disposal of all hazardous materials. The General Contractor is responsible to coordinate demolition work and sequencing with all other Contractors, the Engineer, and the Owner.

1.02. REFERENCES

- A. Appendix 1
- B. General Requirements
 - 1. Except as modified by governing codes and by this specification, comply with the applicable provisions and recommendations of latest editions of the below-listed references.
 - 2. Where the language in any of the documents referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this contract unless otherwise directed by the Engineer.

3. Conflicts - Conform to requirements of cited standard unless specified otherwise. In case of apparent conflict between standards, or between standards and the specifications herein, the more stringent shall apply unless otherwise directed by the Engineer.
- C. The Contractor shall comply with all applicable federal, state and local regulations, standards, codes and guidelines concerning the removal and disposal of material containing lead, including, but limited to the following:
1. New York State Department of Environmental Conservation (NYSDEC) - Comply with the following Parts of 6 NYCRR:
 - a. Part 360 Solid Waste Management Facilities.
 - b. Part 364 Waste Transporter Permits.
 - c. Part 370 Hazardous Waste Management System - General.
 - d. Part 371 Identification and Listing of Hazardous Wastes.
 - e. Part 372 Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities.
 - f. Part 373 Hazardous Waste Management Facilities.
 - g. Part 376 Land Disposal Restrictions.
 2. New York State Department of Transportation (NYSDOT) - Comply with 49 CFR Parts 100 through 199.
 3. Occupational Safety and Health Administration (OSHA) – Part 1926, Safety and Health Regulations for Construction, Subpart D, Occupational Health and Environmental Controls, Standard 1926.62, Lead.
 4. Occupational Safety and Health Administration (OSHA) – Part 1910, Occupational Safety and Health Standards, Subpart Z, Toxic and Hazardous Substances, Standard 1910.1025, Lead.
 5. United States Department of Housing and Urban Development (HUD) - Guidelines for Evaluation and Control of Lead Based Paint Hazards - Title Ten of Housing and Community Act of 1992.
 6. United States Environmental Protection Agency (EPA)
 - a. Resource Conservation and Recovery Act (RCRA) Section 3004 Hazardous and Solid Waste Amendments.
 - b. Toxicity Characteristics Leaching Procedure, EPA Method 1311.

7. American Society for Testing and Materials (ASTM):
 - a. E1728-99, "Standard Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques."
 - b. E1727-99, "Standard Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques."
 - c. E1792-96a, "Standard Specification for Wipe Sampling Materials for Lead in Surface Dust."

1.03. SUBMITTALS

- A. Within 60 days of the Notice to Proceed, and prior to conducting any demolition or removal work at the project site, Contractor shall submit a site and location-specific work plan showing specifics of how Contractor will satisfy all applicable laws, codes, rules and regulations and the requirements of this section including:
 1. Identity and qualifications of Contractor's designated competent person.
 2. Engineering and work practice controls.
 3. Cleaning procedures.
 4. Types of equipment, including, but not limited to:
 - a. Respirators in compliance with 29 CFR 1910.134.
 - b. HEPA vacuuming equipment.
 - c. Collection and disposal containers.
 - d. Materials for creating dust control areas.
 5. Emergency procedures for fire and medical emergencies.
 6. Procedures for failure of containment barriers, if used.
 7. Proof that Contractor has similar experience working with lead-containing paint and lead-based paint in municipal settings.
 8. Employee exposure assessment to lead.
 9. Physician's written opinion that the employees are fit for duty.
 10. Respiratory protection program, if lead exposure will be above the PEL.
 11. Results of employee blood lead and ZPP levels, if lead exposure will be above the PEL.
 12. Proof of Hazardous Communication program.

13. Procedures for paint removal, containment, visible emissions monitoring, and clean-up.
 14. Drawings indicating the location, size, and details of lead dust control work areas, location and details of containment and decontamination facilities
 15. Proposed schedule and sequencing of lead removal activities.
 16. Procedures for waste handling, testing, storage, transportation and disposal.
- B. Without delay as available during conduct of the work, submit copies of all laboratory test results on wipe samples obtained for the work.
- C. Without delay as available during conduct of the work, submit copies of all waste shipment records and disposal site receipts documenting proper disposal of any materials classified as hazardous.

1.04. QUALITY ASSURANCE

- A. The persons performing lead abatement and their supervisor shall be personally experienced in lead abatement work and shall have been regularly employed by a company performing lead abatement work for a minimum of three years. Submit evidence documenting worker training and experience to the Engineer. The Contractor shall obtain the services of a qualified subcontractor if necessary to comply with the requirements of this section.
1. If a subcontractor is utilized to perform any of the work of this section, the requirements of this Section shall apply to the subcontractor as if specifically referred to herein and he shall comply. The Contractor's use of a subcontractor(s) shall not relieve the Contractor of full responsibility for the work to be performed.
- B. Any laboratory providing services in connection with the work shall be certified by the New York State Department of Health (NYSDOH) in the analysis of lead and other heavy metals such as zinc, cadmium and chromium and submit proof of providing similar laboratory services on at least five projects in the last three years. Any such laboratory shall be accredited by the American Industrial Hygiene Association (AIHA) and certified by the Environmental Laboratory Accreditation Program (ELAP) as required by the NYSDOH. The laboratory should actively participate and show proficiency in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing (PAT) program. The laboratory conducting worker blood analysis shall be approved by OSHA and NYSDOH. Submit evidence documenting laboratory qualifications to the Engineer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. COORDINATION WITH THE OWNER'S OPERATION

- A. Contractor shall provide seven days written notice to the Engineer prior to the start of any paint removal work.
- B. Contractor shall make every effort to establish containment areas such that they do not prohibit access by plant personnel to operating equipment.

3.02. MONITORING, TESTING, AND SAMPLING EQUIPMENT

- A. Contractor shall properly calibrate and supply the instrumentation needed for the monitoring of workers including all equipment needed for its operation (e.g., generators, batteries, power cords, fuel, etc.) as required by OSHA.
- B. Contractor shall use equipment that is free of loose dust and debris when brought onto each work site, and upon removal. Contractor shall vacuum using High Efficiency Particulate Air (HEPA) filtered vacuum shrouds and/or wet wipe the equipment with an approved cleaning solution to assure that it is clean prior to removal from the work site.

3.03. WASTE CONTAINERS

- A. Hazardous Waste - Contractor shall provide USDOT-approved containers in accordance with 49 CFR 178 (e.g., 17H containers in the case of 55-gallon drums) of the appropriate size and type for the hazardous waste generated on the project. Use containers that are resistant to rust or corrosion (painted, if constructed of steel), that have tight fitting lids or covers, and which are water-resistant and leak proof. Provide the Engineer with a signed statement that the containers are labeled as required by applicable federal, state and local regulatory requirements.
- B. Non-Hazardous Waste - Contractor shall provide all containers for non-hazardous waste. Use containers that are free of loose debris when brought on site. Containers shall be watertight and corrosion resistant.
- C. Spent Solvents - Contractor shall provide all containers for spent solvents, whether the solvent is designated for reuse, or for disposal as hazardous waste, and do not mix spent solvents with spent abrasives, paint debris, water, or other waste. Containers shall be watertight and corrosion resistant.
- D. Container Maintenance - Contractor shall maintain all containers in good operating condition with lids and closing mechanisms intact and operational to prevent the escape of debris, spilling of the contents, or access by unauthorized personnel and observe all labeling requirements.

3.04. CONTAINMENT

- A. Contractor shall provide proper containment measures in all areas where LBP is to be removed. LBP shall be removed without damage or contamination to adjacent areas, buildings, waterways or the environment in any fashion. This shall include any water runoff from wet removal methods. Water runoff from wet removal methods shall not be discharged to plant drains.
- B. Contractor shall prevent dust, paint chips, spent removal media, solvents, and other debris from entering any plant drain and shall immediately contain and clean up any materials which become deposited near or in any plant drain or come into contact with any standing or flowing water within the plant.
- C. Contractor shall supply all equipment and materials needed to contain emissions, releases, waste and/or debris in accordance with OSHA standards.
- D. Establish emergency and fire exits from the containment area. Provide first aid kits and two full sets of protective clothing and respirators for use by qualified emergency personnel outside of the work area.
- E. Provide a logbook throughout the entire term of the project. All persons who enter or leave the containment area shall sign the logbook. Document any intrusion into the work area or other incident in the logbook.

3.05. REMOVAL OF LEAD-BASED PAINT

- A. Perform removal of LBP in accordance with the approved LBP removal work plan.
 - 1. Use procedures and equipment as required to limit occupational and environmental exposure to lead when lead-based paint is removed in accordance with referenced standards.
 - 2. Remove lead based paint a minimum distance of 6 inches on all sides of the location proposed for cutting, burning, power tool use and/or other work that will disturb, affect or demolish the paint.
 - 3. Limit the production and dissemination of dust as much as possible.
- B. LBP shall be removed to the extent required to perform the safe and lawful removal and disposal of the equipment or piping scheduled for demolition.
 - 1. Torch cutting, open flame burning, power tool use and/or other work which will disturb, affect or demolish lead-based paint shall be permitted only after all visible paint has been removed from the substrate surface for a minimum distance of 6 inches on all sides of the location proposed for cutting, burning, power tool use and/or other work which will disturb, affect or demolish the paint.

3.06. WORK AREA CLEAN-UP AND MAINTENANCE

- A. At the end of each work day, the Contractor shall visually inspect the entire work area for dust, paint chips, spent paint removal media, solvents, and other debris that have been deposited within the work area or surrounding surfaces, water or soil. If debris from the Contractor's operations is observed outside the initial inspection limits, the limits shall be expanded to include additional areas as directed by the Engineer.
- B. Contractor shall clean up all visible dust, paint chips, spent paint removal media, solvents, and other debris at the end of each work day, or more frequently as directed by the Engineer.
- C. Clean all surfaces within the work area and surrounding areas at the end of each work day by wet vacuuming and/or wet wiping or washing, as directed by the Engineer. When wet vacuuming, use only vacuums that are equipped with HEPA filters. Conduct wipe sampling to verify that lead levels are below the required clearance criteria. If lead levels exceed this clearance criteria, repeat clean-up procedures as necessary until wipe sampling verifies that lead levels are below the clearance criteria.

3.07. CERTIFICATION

- A. At the completion of lead-based paint removal operations, Contractor shall provide the services of a qualified laboratory to perform post-cleaning testing of surfaces within the work area and areas adjacent to the containment area to verify that lead-based dust and other debris generated by the Contractor's operations have been properly cleaned from the area. The Engineer shall be present during all wipe testing. Contractor shall submit a letter to the Engineer certifying that the work areas have been properly cleaned.

3.08. PRE-DISPOSAL TESTING

- A. Prior to disposal, test the removed materials for toxicity in accordance with EPA Method 1311, Toxicity Characteristic Leaching Procedure.
- B. Test results indicating a value greater than 5 ppm lead classifies the removed material as hazardous waste.
- C. Removed material shall be classified according to the requirements of the receiving site and the agencies having jurisdiction.

3.09. DISPOSAL OF LEAD PAINT AND RELATED DEBRIS

- A. Transport and dispose of LBP and related debris classified as hazardous waste in accordance with the standards referenced in Part 1 of this section
- B. All generated waste removed from the site must be documented, accounted for and disposed of in compliance with all federal, state and local regulations.
- C. In addition to any requirements of New York State, comply with all transportation and disposal requirements of the jurisdiction of the disposal site.

3.10. RESTORATION

- A. Remove temporary decontamination facilities and restore the work area to its original condition or better.
- B. Restore any areas outside the work area damaged or contaminated by the Contractor's operations to their original condition or better.

3.11. RECORDKEEPING REQUIREMENTS

- A. Contractor shall comply with all federal, state and local regulations regarding record keeping requirements concerning the handling and disposal of LBP and related debris.
- B. Contractor shall document the transportation and disposal of LBP and related debris using four copy manifests. Each manifest shall be numbered and shall document the contents of each waste container and shall record the chain of custody from the time the materials are removed from the site to the time of proper disposal.
 - 1. One copy of each manifest shall be provided to the Engineer immediately upon removal of any waste container from the site.
 - 2. One copy of each manifest shall be maintained by the Contractor in his office at the site and shall be produced upon demand by the Owner, NYSDEC, NYSDOH, or any other entity having jurisdiction. Manifests shall be turned over to the Owner at the completion of the project.
- C. Contractor shall submit to the Engineer a Certificate of Disposal within 30 days of the completion of disposal of lead-containing waste. The certificate shall include:
 - 1. The identity of the recycling or disposal facility, by name, address, and EPA identification number.
 - 2. The identity of the lead waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
 - 3. A statement certifying the fact of disposal of the identified lead waste, including the date(s) of disposal and identifying the disposal process used.
 - 4. A copy of the relevant shipment manifest(s) shall be attached to each Certificate of Disposal.

END OF SECTION

SECTION 02841

PCB-CONTAINING MATERIALS REMOVAL

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. The Limited Hazardous Materials Survey (Survey) included as Appendix 1 in this Project Manual summarizes sampling undertaken on behalf of Owner. The survey report identifies locations of PCB-containing materials (PCB-CM) at facilities owned by the X, including the XX The survey is intended to be a reference and may not be inclusive of all the hazardous materials present at the project facilities.
- B. General Contractor shall provide all labor, materials, equipment, services and incidentals necessary for safe and lawful demolition, removal, and disposal of all of the PCB-CM and associated PCB-contaminated materials necessary to complete the project work and as specified by the Owner and Engineer. The General Contractor is also required to provide all labor, materials, equipment, services and incidentals necessary for safe and lawful demolition, removal and disposal of all material present at the project facilities that can reasonably be assumed to be PCB-CM or associated PCB contaminated materials. At each building, location or facility where PCB-CM was identified in the survey or identified during the project, all like material belonging to the same construction assembly or serving the same purpose at the building, location or facility is to be assumed to be PCB-CM and is to be handled as such.
- C. PCB Non-Remediation Waste - Debris generated from construction materials manufactured with PCBs with a concentration greater than 50 ppm as a result of building renovation and demolition projects shall be referenced hereafter as PCB bulk product waste.
- D. All work under this contract shall be performed in strict conformance with applicable federal, state and local rules, laws and regulations.
- E. Contractor shall be aware of all conditions of the project and is responsible for verifying quantities and locations of all work to be performed. Failure to do so shall not relieve the contractor of its obligations to furnish all labor and materials necessary to perform the work.
- F. The Contractor shall furnish all labor, materials, services, employee training, permits, insurance, and equipment for the disturbance and/or removal of PCB bulk product waste.
- G. The Contractor will be responsible for performing all work in strict accordance with the Contract Documents and all governing codes, rules and regulations. Where conflicts occur between the Contract Documents and applicable codes, rules, and regulations, the more stringent shall apply.
- H. When performing any tasks in work areas that contain this PCB-CM, the Contractor is responsible for PPE (Personal Protective Equipment) for all workers in accordance with applicable regulations.

- I. The General Contractor shall provide a third-party Environmental Consultant who shall serve as an independent representative to evaluate the performance of the PCB caulk abatement. The Environmental Consultant shall perform visual inspections for all work areas to ensure completeness of removal and clean-up.
- J. The General Contractor is responsible for demolition, removal, and disposal of all hazardous materials. The General Contractor is responsible to coordinate demolition work and sequencing with all other Contractors, the Engineer, and the Owner.

1.02. RELATED DOCUMENTS

- A. Appendix 1

1.03. APPLICABLE STANDARDS AND REGULATIONS

- A. Applicable Federal Regulations - All work done under this contract shall be in compliance with:
 - 1. U.S. Environmental Protection Agency (USEPA) regulations under the Toxic Substances Control Act (TSCA) found in Title 40 of the Code of Federal Regulations (40 CFR) Part 761.
 - 2. Occupational Safety and Health Administration (OSHA) 29 CFR 1926 for protection of workers.
 - 3. Transportation shall be in accordance with all Federal laws including the Federal Motor Carrier Safety Regulations found in 49 CFR, Parts 390, 391, 392, 393, 396, and 397 and the Hazardous Materials Transportation Regulations found in 49 CFR, Parts 100 through 199 as they apply to interstate highway transportation.
- B. Applicable State Regulations - All work done under this contract shall be in compliance with:
 - 1. New York State Department of Environmental Conservation (NYSDEC) regulations found in 6 NYCRR Parts 370 through 376 defined as New York State's Hazardous Waste Management Regulations.
 - 2. Transportation shall be in accordance with Sections 14(f), 140(2), 211 and 212(a) of the State Transportation Law and Article 19-B of the State Vehicle and Traffic Law.

1.04. SUBMITTALS

- A. Pre-Abatement Submittals
 - 1. Prior to commencement of the work on this project, the Abatement Contractor must submit one copy of the following to the Engineer:
 - a. Copy of the current insurance certificate with pollution coverage.
 - b. Remediation Plan; general work practices and procedures to be followed.

- c. The Competent Person name.
 - d. HAZWOPER certifications for all employees working on the project.
 - e. Physician's written opinion that the employees are fit for duty.
 - f. Current respirator fit test.
 - g. Proof of respiratory protection program 29 CFR 1910.134.
 - h. Copy of Waste Transporter Permits/License.
 - i. Copy of Hazardous Waste Manifest to be used.
 - j. Copy of disposal facility license to accept and dispose of PCB waste stream.
 - k. List of previous work experience on similar jobs.
 - l. OSHA violations received in the past five years.
 - m. Approved laboratory certificate for required OSHA personal air sampling.
2. Equipment - The Abatement Contractor shall submit manufacturer's information on the following equipment:
- a. HEPA vacuums.
 - b. Respirators (including filter cartridges).
 - c. Protective clothing.
 - d. Polyethylene sheeting.
 - e. Duct tape.
 - f. Disposal bags.
3. Safety Data Sheets (SDS) - The Contractor shall submit copies of SDS for each chemical or material used for projects including but not limited to:
- a. Encapsulants.
 - b. Remover/solvents.
 - c. Cleaner/disinfectants.
 - d. Surfactants.
 - e. Spray adhesive.

4. Progress Schedule - Show the complete sequence of abatement activities and the sequencing of work for building section.
- B. Post-Abatement Submittals - The Contractor shall submit copies to the Engineer for file:
 1. The location and description of the project.
 2. The amount of PCB caulks and contaminated building material that was abated.
 3. The commencement and completion dates of the project.
 4. The name and address of the deposit or waste disposal site or sites where the PCB waste material was deposited or disposal.
 5. The name and address of any sites that were used for the interim storage of PCB waste materials prior to final deposit or disposal.
 6. The name and address of any transporter(s) that were used to transport PCB waste material.
 7. Copy of all waste disposal manifests, and disposal logs.

1.05. ENVIRONMENTAL TESTING

- A. The General Contractor shall provide a third-party Environmental Consultant who shall serve as an independent representative to evaluate the performance of the PCB caulk abatement. The Environmental Consultant shall perform visual inspections for all work areas to ensure completeness of removal and clean-up.

1.06. SPECIAL JOB CONDITIONS

- A. Contractor shall provide temporary protection, to keep the work areas secure and weather tight at all times, during the performance of the contract work. The Contractor shall be responsible for any damage caused by the installation and/or removal of the temporary protection.
- B. The Contractor will be responsible for any damage resulting from improper storage of materials and accidental spills or releases.
- C. The Abatement Contractor shall provide all safety equipment necessary for proper use of all ladders, scaffolds, and/or aerial lifts; and ensure employees are properly trained in their individual uses.
- D. The Abatement Contractor shall coordinate all sidewalk and entry/exit closures with the Owner no less than 48 hours prior to closure.

PART 2 PRODUCTS

2.01. PROTECTIVE CLOTHING

- A. The Contractor shall provide personnel utilized during the project with disposable protective whole body clothing, head coverings, gloves and foot coverings as well as provide disposable Nitrile gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.
- B. The Contractor shall provide sufficient quantities of protective clothing to assure a minimum of four complete disposable outfits per day for each individual performing abatement work.
- C. Eye protection and hard hats shall be provided by the Contractor and made available for all personnel entering any work area.
- D. The Contractor shall provide authorized visitors with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the work area.

2.02. SIGNS AND LABELS

- A. Generator identification information shall be affixed to each PCB waste container.

2.03. DRUMS

- A. Provide metal or fiberboard drums or equivalent storage containers for transportation and storage of PCB bulk product waste.

2.04. HEPA VACUUM EQUIPMENT

- A. All vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.
- B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose.
- C. Each HEPA equipped vacuum shall be equipped with a HEPA filter that has never been used or each HEPA equipped vacuum must be inspected and tested prior to being brought on site for the proper operation and performance of the HEPA filter. Inspection and testing shall be in accordance with the manufacturer's recommendations. Proof of inspection and testing for each HEPA equipped vacuum must be made available to the Owner or Owner's Representative upon request. Each HEPA-equipped vacuum must be tagged with the date of the last HEPA filter change.

2.05. POWER TOOLS

- A. Power tools used to drill, cut into, or otherwise disturb material shall be equipped with HEPA filtered local exhaust ventilation.

- B. The use of variable speed oscillating multifunction power tools shall be allowed for exterior removals only. All other power tools used for the work shall be approved by the Owner's Representative and the consultant prior to use for the work.

2.06. POLYETHYLENE SHEETING

- A. All polyethylene (plastic) sheeting used on the project (including, but not limited to, sheeting used for critical and isolation barriers, fixed objects, waste container) shall be at least 6-mil fire retardant sheeting.

PART 3 EXECUTION

3.01. GENERAL

- A. When working with PCB caulk, work practices shall be performed in a manner that minimizes or prevents airborne dust generation and release to adjacent areas. Debris shall be collected and area shall be wiped down to collect dusts in accordance with all applicable regulations. A double wash/rinse procedure shall be performed on porous building materials.
- B. Contractor shall maintain security in the building and work areas at all times, for the duration of the work including, but not limited to, hygiene facilities and temporary waste storage sites.
- C. Contractor is responsible for OSHA personal air monitoring for PCB exposure for all workers.
- D. Contractor shall use work practices consistent with applicable regulations to protect workers from exposure to PCBs during demolition, modification, storage, and handling of PCB-containing materials.
- E. XX shall be the generator of the waste, and shall supply its EPA I.D. number and address for use in filling out the manifests. Contractor shall be responsible for the preparation of the manifest (information and tracking form) to be signed by all applicable parties. Contractor shall allow two weeks for the Owner to review and sign the completed manifests. Submit copies of all pertinent Hazardous Waste Manifests to the Engineer.
- F. Owner will provide electrical and water utilities. Contractor shall provide all necessary power cords, ground fault circuit interrupters, and water hoses necessary to access the work area. All temporary power to the work area shall be brought from outside the work area through a ground fault circuit interrupter.
- G. Under no circumstances shall contaminated wastewater be allowed to enter the storm or sanitary sewer systems.
- H. Emergency and fire exits from the work area shall be maintained according to all applicable codes. If emergency and fire exits must be closed to perform the work, Contractor will coordinate any closures with Owner no less than two working days prior to closure to allow adequate building occupant notification.

3.02. WORK AREAS

- A. This work shall consist of furnishing and installing a restricted area around the immediate work to isolate the area and limit access to non-authorized personnel during work. Place protective barriers over all entrances. This may be achieved by erecting fencing or utilize barrier tape to restrict access.
- B. Install an impermeable drop cloth below the immediate work area to contain and collect debris generated during the work.
- C. Provide hygiene facilities adjacent to the work area for worker and tool decontamination. Hygiene facilities shall be installed as follows:
 - 1. An impermeable drop cloth on the ground for a worker decontamination area.
 - 2. The area shall be equipped with a water spray bottle, towels, a wash bin to collect wastewater, and a waste bag for disposable clothing and cleaning materials.
 - 3. The worker shall HEPA vacuum work clothing and wet clean tools and waste bags before removing them from the restricted area.
- D. A variable speed oscillating multifunction power tool may be utilized for exterior removals. All other power tools used for the work shall be approved by the Environmental Consultant prior to use for the work.
- E. When aerial lifts are employed, the working platform shall be covered in two layers of reinforced 6-mil polyethylene plastic sealed at the edges to collect any loose PCB material dislodged from the work. Contractor must provide proper traction surfaces or equipment to assure the safety of the workers.
- F. Operable windows shall be sealed and ground covered with polyethylene plastic from exterior face of building to 10 feet away from exterior face or furthest point of gravity fall for material dislodged by removal techniques employed, whichever is further. Debris shall be collected and area shall be wiped down to collect dusts in accordance with all applicable regulations. A double wash/rinse procedure shall be performed on porous building materials.
- G. PCB materials shall be removed from their substrate substantially intact and immediately containerized for disposal. Excessive amounts of PCB material (one shovel full) shall not accumulate on the drop cloth below the work.
- H. Inclement Weather - Removal operations shall be suspended at any time when satisfactory control of the overall operation cannot be maintained on account of rain, wind, lightning, or other unsatisfactory weather or ground conditions. Determination of such conditions should be made by the Abatement Contractor and the Owner's Representative. When such conditions exist, the work area should be cleaned up immediately and work suspended. High winds can disperse bulk material, contaminated soil and dust to off-site areas and runoff from rain can carry contamination outside the abatement area.
- I. For projects lasting more than one work day; daily cleaning using HEPA filtered vacuums and wet wiping techniques shall be performed on all surfaces in the work area.

- J. All waste generated from the day's work shall be stored in a secure lockable area away from public access. The Contractor shall perform a daily visual inspection to ensure no dust or debris has accumulated on the exterior of the work area and the work area barriers remain intact during the work.
- K. Upon completion of bulk removal, Contractor shall perform one thorough cleaning of the removal substrate, working platform and drop cloth. Contractor will then notify the Environmental Consultant to perform a visual inspection to confirm completeness of abatement and completeness of cleanup. Upon completion of a satisfactory visual inspection, the restricted area may be dismantled.

END OF SECTION

SECTION 02980

SITE REHABILITATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Site rehabilitation of lawns, existing cultivated or landscape items such as trees, shrubs, hedges, saplings, vines, ground cover vegetation, gardens, etc.
- B. Restoration of uncultivated lands.
- C. Topsoil, fertilizer, seeding, mulching and planting.
- D. Site rehabilitation of walls, terraces, fences, ditches, drains, culverts, drives, posts, patios, outdoor recreational equipment, garden decorations and appurtenances, small structures, and all other artificial features.
- E. Site modifications and development to meet new conditions.
- F. Removal and disposal of all excess materials, equipment, trash and debris used for, or resulting from, the work included in this section.

1.02. REFERENCES

- A. The American Association of Nurserymen Standards - ANSI Standard 2-60.1, "Nursery Stock".
- B. Soil Conservation District of the Department of Agriculture.

1.03. QUALITY ASSURANCE

- A. Areas and Features to be Restored
 - 1. All areas, including natural features occurring thereon, which are damaged or disturbed by the Contractor's operations, shall be restored, repaired or replaced to the same or superior condition which existed prior to construction or as modified herein or as shown on the Drawings.
 - 2. Artificial features shall be restored equal to a new condition or as modified herein or as shown on the Drawings.

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Submit the source nursery for all plantings.
- C. Topsoil - Submit sieve analysis and characteristics of topsoil as listed in Part 2.

- D. Seed mixture data.

1.05. QUALIFICATIONS

- A. All planting material to be furnished from a nursery which meets the requirements of the American Association of Nurserymen.

1.06. PACKING AND SHIPPING

- A. All seed furnished for this project shall be delivered in standard size unopened bags of the vendor, showing weight, mixture, vendor's name and guaranteed analysis.

1.07. STORAGE

- A. Seed shall be properly stored in dry conditions at the site of the work.
 - 1. Any seed damaged or spoiled during storage shall be replaced by the Contractor.

1.08. ENVIRONMENTAL CONDITIONS

- A. Topsoil shall not be delivered or placed in a frozen or muddy condition.
- B. Seeding is to be done on dry or moderately dry soil.
 - 1. Seeding is to be done when the wind velocity does not exceed 5 miles per hour.

1.09. SCHEDULE

- A. The Contractor is advised to do all seeding during the periods of May 1st to June 15th, or August 15th to October 1st.
 - 1. Seeding may be conducted under unseasonable conditions without additional compensation, and at the option and full responsibility of the Contractor.

1.10. GUARANTEE

- A. Any new, reestablished, replaced or disturbed plant material that fails to respond properly within the one-year guarantee period shall be replaced as specified above at the Contractor's expense.

PART 2 PRODUCTS

2.01. MATERIAL

- A. Topsoil
 - 1. Topsoil shall be natural, fertile, friable agricultural soil capable of sustaining healthy vegetative growth.
 - 2. Topsoil shall meet the following gradation requirements free of stones, roots, sticks and other foreign substances.

Grain Diameter	Sieve Size	Percent Passing by Weight
6.3 mm	6.3 mm	100
4.75 mm	No. 4	60-85
0.075 mm	No. 200	20-45
0.002 mm	--	7-27

- a. Topsoil shall contain less than 52 percent sand.
3. The pH of topsoil shall be between 5.0 and 7.0.
4. Topsoil shall contain no less than 6.0 percent organic matter.
5. Topsoil may be from previously excavated, stockpiled and protected materials, provided the materials meet the requirements for topsoil.

B. Fertilizer

1. General Fertilizer
 - a. Fertilizer shall be a complete, partially organic, commercial 10-6-4 fertilizer.
 - b. All fertilizer shall contain a minimum of 10 percent nitrogen, 6 percent available phosphorous and 4 percent potash.
 - c. Other commercially available fertilizers, such as 20 10-10 and 12-6-6, may be utilized provided that spreading rates are adjusted to provide the aforementioned minimum requirements for nitrogen.
2. Plant Fertilizer - As recommended by local Soil Conservation District of the Department of Agriculture for the type(s) of soil(s) and plant(s).

C. Seed

1. All seed shall be fresh, re-cleaned and of the latest crop year.
2. Each component shall meet or exceed the minimum State and Federal requirements for purity and germination for that component.
3. The weed content of each component shall not exceed 0.1 percent.
4. The following seed mixture is suggested for lawns or cultivated (landscape) areas:

Percent by Weight	Variety	Purity	Germination
50	Kentucky Blue Grass	85%	80%
20	Red or Chewing Fescue	97%	80%
30	Red Top	92%	90%

- a. Variations may be recommended by qualified personnel, but shall not be used without approval by the Engineer.

5. For uncultivated areas furnish perennial rye grass seed.
- D. Mulch for Tree or Shrub Plantings - Mulch shall consist of dry, clean, hardwood chips.
- E. Mulch for Seeded Areas - Mulch shall be oat, wheat or rye straw, or hay, free from noxious weeds and other materials which may interfere with the establishment of a healthy stand of grass.
- F. Plantings - Trees, shrubs, vines, ground cover and other vegetation to be replaced or installed new as specified which meet the requirements of the American Association of Nurserymen.
 1. Classifications of plants, dimensions, planting procedures, etc., shall conform to ANSI Standard Z 60.1, "Nursery Stock".
- G. Peat Moss - As recommended by the supplier of nursery stock.
- H. Metal Edging
 1. Edging shall be 3/16-inch thick by 4-inches high steel in 16- and 20-foot lengths.
 - a. Secure edging with 16-inch long tapered steel stakes at 30 inches on center.
 - b. All steel materials shall be painted with one coat of epoxy primer and two coats of epoxy finish.
- I. Weed Barrier - Weed barriers shall consist of two plies of 6-mil thick black polyethylene film.
- J. Stones
 1. All stones used for landscape surfacings shall be between 2 and 4 inches in maximum dimension and average to about 3 inches.
 - a. Stones shall be well-rounded.
 2. All stones used for mowing strips shall be a washed crushed stone, size 1/2-inch to 1-inch size.
- K. Tree Wrapping - Wrapping for trees shall be 8 ounce first quality burlap.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Determine that surface area is ready for fine grading and/or to receive topsoil and seeding or plantings.
 1. Remove trash, debris, large stones and other foreign materials from surface areas to be restored or rehabilitated.

2. Topsoil shall be free of frozen fragments, debris, large stones, and other foreign materials.

3.02. PREPARATION

- A. Fine Grading - Areas requiring topsoil shall be fine graded to within 4 inches of finished grade to provide a minimum compacted thickness of 4 inches of topsoil at all locations.
 1. All such areas, whether in cut or fill, shall be raked to a depth of 1 inch, be parallel to finished grade as shown or required and shall be free of all stones, larger than 1 inch, roots, rubbish and other deleterious material.

3.03. INSTALLATION

- A. Areas to be Developed
 1. When the project site is to be modified and developed to meet new conditions, the Contractor shall perform all required grading, topsoiling, fertilizing, seeding, planting, mulching and maintenance of areas, all in accordance with the Drawings and as specified herein.
 2. Unless shown otherwise on the Drawings, the entire unpaved area within the grading limits and within the overall areas excavated and backfilled shall be so developed.
 3. New landscaping work and artificial features, if any, are shown on the Drawings and specified elsewhere.
- B. The Contractor shall reestablish all existing cultivated or landscape items, trees, shrubs, vines and ground covers as practicable.
 1. Contractor shall provide additional or modify existing vegetation, as shown on the Drawings.
 2. Existing trees, plants, shrubs, saplings, ground cover, vines, etc., which are disturbed or damaged by the Contractor's operations shall be replaced with new plant materials.

3.04. TOPSOILING

- A. Topsoil shall be furnished and spread in the required areas to a depth of approximately 4 inches.
 1. Stockpiled topsoil may be used if approved by the Engineer.
 2. In the event this topsoil is not satisfactory, or is inadequate to cover the required areas, the Contractor shall furnish the required amount of satisfactory topsoil from approved sources off the site.
- B. The soil shall be uniformly compacted with a light hand roller to a final depth of not less than 2 inches.

1. When finished, the surface shall conform to the finished grades shown or required and shall have a smooth pulverized surface at the time of seeding.
2. Any irregularities shall be corrected before the fertilizer and seed are placed.
3. Any subsequent settlement or displacement of the topsoil shall be restored to an acceptable condition at the Contractor's expense.

3.05. FERTILIZING

- A. The fertilizer shall be uniformly spread by a mechanical spreader at the rate of 25 lbs. per 1,000 square feet.
 1. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading.
 2. Other commercial fertilizers, such as 20-10-10 or 12 6-6 may be used at rates adjusted to provide the same quantity of nitrogen per 1,000 square feet.

3.06. SEEDING

- A. Seed shall be applied at a rate of not less than 5 lbs. per 1,000 square feet, using a mechanical spreader.
 1. Upon completion of the seeding, the area shall be raked lightly and rolled with a light hand roller.
- B. The process of spraying grass seeds, water, fertilizer and mulch known as hydro-seeding or hydro-mulching may be utilized provided that water hazards are minimized.
 1. Presoaking, the spraying of the materials and watering after spraying shall be in strict accordance with the manufacturer's instructions.
 2. All materials, protection, maintenance, etc., shall be in conformance with this specification.
 3. The mulch may be a wood fiber material compatible with the spray equipment.

3.07. PLANTING

- A. All new plant materials which are to replace existing plant materials shall be of the same genus and species as the original, and shall be placed in the same location as the item being replaced.
 1. The size of the new plant materials shall, if practical, match that of the item being replaced, consistent with normally available sizes from nursery stock.
 2. Depending on the size and type of material, and when ordered by the Engineer, guy wires, stakes, anchors and wrappings shall be furnished and installed in a proper manner to brace and protect the plant.

3. The Contractor shall, as soon as practicable, water and maintain all reestablished, replaced or disturbed plant materials until final acceptance of the contract.
- B. Plant shall be set plumb and true.
 1. Shape area around saucer to form drainage grades as shown on the Drawings.
- C. Install wooden posts, guy wires and hose section for protection as shown on the Drawings.
 1. Provide three guy wires per planted item.
- D. For all trees of 2-inch caliber or larger, wrap with tree wrap.
 1. Begin at base of tree and work upward to the first branches.
 2. Tie the burlap wrap with cord (no synthetic cord nor wire) at 2-foot intervals and at the bottom and top.
- E. Place weed barriers on prepared subgrade at depth shown on the Drawings.
 1. Turn up weed barrier at all edges and corners.
- F. Place washed stone over weed barriers to the specified depths.
 1. Rake stone to produce a smooth, uniform surface.
- G. Install metal edging such that the top edge projects 1/4 inch above surrounding soil and stone.

3.08. MULCHING AND PROTECTION

- A. The Contractor shall protect and maintain seeded areas to assure a full even stand of grass.
 1. Immediately after seeding and rolling, the Contractor shall apply oat, wheat or rye straw, or hay, free from noxious weeds, as a mulch, to a loose depth of about 1 inch.
 2. The Contractor shall perform all watering and reseeding as necessary for a minimum of 30 days and until final acceptance of the Contract, to ensure the establishment of a uniform stand of specified grasses.

3.09. MAINTENANCE

- A. Any portion of seeded areas failing to produce a full uniform stand of grass from any cause, shall be reseeded at full rate and re-fertilized at one-half rate and protected and maintained until such a full stand has been obtained.
- B. Plantings to be maintained for one year following final acceptance of the contract.

3.10. RESTORATION OF UNCULTIVATED LANDS

A. Areas of uncultivated land shall be restored as follows:

1. The disturbed surfaces shall be rough-graded to the original elevations (± 1 inch) and general appearance which existed prior to construction (or to the new elevations and grades which are required), all debris, loose stones over 1 inch, boulders, etc., being removed in the process.
2. The surface shall then be seeded with perennial rye grass, being spread at the rate of 1 lb. per 800 square feet.

B. The area need not be raked or rolled after completion of seeding.

3.11. SPECIAL CONDITIONS

- A. Damaged Trees - Vegetation which has been damaged by site preparation activities and deemed non-functional by the Owner or engineer, shall be replaced by the Contractor with vegetation of the same caliper, genus and species at no additional compensation to the Contractor.

END OF SECTION

SECTION 03100
CONCRETE FORMWORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Formwork for cast-in-place concrete.
- B. Form hardware, ties, etc.
- C. Form removal; coordinate with rub finish requirements.
- D. Camber requirements for beams and slabs.
- E. Geofoam for support of cast-in-place slabs.

1.02. REFERENCES

- A. The publications listed below form a part of these specifications.
 - 1. ACI 117 - Specification for Tolerances in Concrete Construction and Materials
 - 2. ACI 301 - Specifications for Structural Concrete
 - 3. ACI 347 - Recommended Practice for Concrete Formwork
 - 4. ACI SP-4 - Formwork for Concrete
 - 5. ASTM A653 - Steel Sheet, Zinc Coated

1.03. SUBMITTALS

- A. Submit single-page catalog cuts showing the types of form ties with and without waterstops to be used.
- B. Submit single-page catalog cuts showing all the types of formwork systems to be utilized for the project. (Do not include Contractor's design of formwork system.)

1.04. COORDINATION

- A. Coordinate the installation of all cast-in (embedded) items that need to be included in the formwork.
- B. Design, engineering, and construction of formwork shall be the responsibility of the Contractor and must achieve the desired end results.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Deliver form and accessory materials to site in an undamaged condition. Defective or damaged materials shall not be used.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Form materials shall be new wood, new plywood, or steel.

Do not use poor quality or used forms that will make a rubbed finish difficult to produce. Reference Section 03350, Concrete Finishes. Therefore, worn, used forms will not be allowed on exposed work.

- B. Chamfer forming strips for exposed edges of concrete.

- 1. Exposed edges and outside corners of concrete shall be formed with 3/4-inch by 3/4-inch chamfer forming strips.
- 2. Downstream side of weir plates shall be formed with 3-inch by 3-inch chamfer forming strips unless indicated otherwise.

- C. Reveal Strips

- 1. Reveal strips shall be provided as shown in the patterns and sizes indicated on the Contract Drawings for particular exposed concrete structures.
- 2. Reveal strips shall generally be 1 x 2 wood (or as indicated otherwise on the Contract Drawings), beveled approximately 1/4-inch each side to facilitate removal. The strips shall be sealed with a clear wood sealer prior to the application of form release agent.

- D. Forms shall be coated with a release agent which will not stain concrete, absorb moisture, reduce the bonding characteristics of additional concrete coatings, or negatively affect the rubbed finish process. Use Euclid Chemical "Euco Super Slip," BASF Building Systems "Cast Off," or equal.

- E. Form Ties

- 1. Form ties shall leave no metal closer than 1-inch to the surface of the finished concrete. The ends of the form ties shall create cone-shaped tie holes for sealing with plug mortar per Section 03350, Concrete Finishes.
- 2. Ties used for watertight and below-grade structures shall have a waterstop.
- 3. Snap ties without cone-shaped ends can only be used at unexposed portions of frost walls, retaining walls, and grade beams.

- F. Joint forming materials for interruptions in concrete placement shall be per Section 03250, Concrete Joints and Accessories.

- G. Geofoam Block Backfill: Molded expanded polystyrene conforming to ASTM C578, Type VIII or ASTM D6817 EPS 19 with a density of 1.15 pounds per cubic foot, minimum block size 2 feet by 2 feet by 4 feet as manufactured by Thermal Foams, Buffalo, NY 716-874-6474; Insulated Building Systems, Winchester, VA 540-662-0882; Insulfoam, Tacoma, WA 253-572-5111 or accepted equivalent.

PART 3 EXECUTION

3.01. ERECTION INSTALLATION APPLICATION

- A. Form surfaces shall be smooth and shall be removable in sections, such that no prying against the faces of the new concrete is necessary.
- B. Earth cut forms shall not be used. All footings, slab edges, etc. shall be formed unless specifically shown otherwise on the Contract Drawings.
- C. Soffit forms for beams and slabs shall be constructed to produce a built-in camber equal to 1/8 inch per 5 feet of span length unless indicated otherwise.
- D. Erected forms shall be substantial and rigid, sufficiently tight to prevent leakage of laitance and properly braced and tied to maintain position and shape under the weight and pressure of the newly placed concrete.

All joints between adjacent form panels shall be backed by a waler or stud. Seal formwork by gasketing and caulking to prevent leakage on the preceding placement below or adjacent.

- E. Inspection and cleanout openings shall be provided as required.
- F. Provide formed openings where required for items to be embedded in or passing through concrete work.

Locate and set in place embedded items which will be cast directly into concrete.

Coordinate work of other sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, embedded frames, and other inserts.

- G. Install chamfer forming strips on formwork at edges, outside corners, and at weir locations.
- H. Apply form release agent in accordance with manufacturer's recommendations. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items. Do not apply form release agent where concrete surfaces will receive special finishes which are affected by agent.
- I. Form Hardware
 - 1. Form tie layout shall be in a neat pattern when finished concrete is exposed.
 - 2. Form ties shall not be located within 6 inches from top of concrete placement.
 - 3. No snap ties shall be broken off until the concrete is at least three days old and will not damage the concrete surface.

- J. Tolerances for finish formed surfaces and variations in dimensions shall be in accordance with the following table:

TOLERANCES FOR FORMED SURFACES*

1. Variation from Plumb:	
a. In the lines and surfaces of columns, piers, walls, etc.:	
• In any 10 feet of height	1/4 inch
• Maximum for the entire height if >40 feet	1 inch
b. For exposed corners of columns, wall corners, construction/control joint grooves, and other conspicuous vertical lines:	
• In any 20 feet of height	1/4 inch
• Maximum for the entire height if >20 feet	1/2 inch
2. Variation from Level or from Grades Specified:	
a. In slab soffits, ceilings and beam soffits, measured before removal of supporting shores:	
• In any 10 feet of length	1/4 inch
• In any bay or in any 20 feet of length	3/8 inch
• Maximum for the entire length if >40 feet	3/4 inch
b. At top of walls, sills, and parapets; and along construction joint grooves and other conspicuous horizontal lines:	
• In any bay or in 20 feet of length	1/4 inch
• Maximum for the entire length if >40 feet	1/2 inch
3. Variation of the Linear Building Lines or Lines of Structure from Position in Plan and Related Position of Columns, Walls, and Partitions:	
• In any bay	1/2 inch
• In any 20 feet of length	1/2 inch
• Maximum for the entire length	1 inch
4. Variation in the Sizes and Location of Sleeves, Floor Openings, and Wall Openings:	±1/4 inch
5. Variation in Cross-Sectional Dimensions of Columns and Beams and in the Thickness of Slabs and Walls:	-1/4 inch +1/2 inch
6. Footings and Thickened Edges of Slabs:	
a. Variations in dimensions in plan:	-1/2 inch +2 inches
b. Misplacement or eccentricity:	
• 2 percent of the footing width in the direction of misplacement but not more than 2 inches	
c. Thickness:	
• Decrease in specified thickness	5 percent
• Increase in specified thickness:	No limit but increased thickness must be maintained for minimum 5-foot length

*Tolerances apply to concrete dimensions only, not to positioning reinforcing steel or embedded items.

3.02. FIELD QUALITY CONTROL

- A. Prior to placing concrete, inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design. Verify that all supports, fastenings, wedges, ties, and items are secure.
- B. Clean and vacuum formed cavities of debris prior to placing concrete.

Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior of formwork through cleanout ports.
- C. During cold weather, remove ice and snow from within forms. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. De-icing salts will not be permitted. (Reference Section 03370, Concrete Curing and Protection.)
- D. Damaged or previously used form liners shall not be used and shall be replaced at Contractor's expense.

3.03. FORM REMOVAL

- A. The Contractor shall assume full responsibility for the strength of all components from which forms are removed.
- B. Forms and supports shall remain undisturbed until the concrete has attained sufficient strength to support its own weight in addition to any collateral loads (temporary or permanent) that may be placed upon it during subsequent work. In no event shall any forms be loosened or removed prior to 24 hours' wet cure time.
- C. Non-structural vertical forms such as beam side forms, column forms, and wall forms may be removed at any time after 24 hours, provided that stripping does not damage surfaces and such action does not endanger any part of the structure. Coordinate timing of form removal with rub finish requirements specified in Section 03350, Concrete Finishes.
- D. No structural forms and shoring supporting underside of slabs or beams shall be removed prior to concrete attaining at least 80 percent of the required design strength and no less than 14 days after placing concrete. Field-cured cylinders (paid by the Contractor) can be taken for consideration to remove the structural forms sooner than 14 days.

During cold weather conditions, do not remove structural forms sooner than 21 days after placing concrete. Reference Section 03370, Concrete Curing and Protection, for cold weather requirements.

- E. Immediately reshore all concrete required to support formwork for subsequent concrete placement. Any slab to be cast shall be shored downward.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Reinforcing bars.
- B. Welded wire reinforcement.
- C. Galvanized reinforcing bars.
- D. Fiber reinforcement.
- E. Threaded rebar splicing system.
- F. Mechanical rebar splicing system.
- G. Bar supports and bolsters.

1.02. REFERENCES

The publications listed below form a part of these specifications.

- A. American Concrete Institute
 - 1. ACI 301 - Specifications for Structural Concrete
 - 2. ACI 315 - Details and Detailing of Concrete Reinforcement
 - 3. ACI 315R - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures
 - 4. ACI 318 - Building Code Requirements for Structural Concrete
 - 5. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures
 - 6. ACI 530 - Building Code Requirements for Masonry Structures
- B. American Society for Testing and Materials
 - 1. ASTM A185 - Steel Welded Wire Reinforcement, Plain, for Concrete
 - 2. ASTM A497 - Steel Welded Wire Reinforcement, Deformed, for Concrete
 - 3. ASTM A615 - Deformed and Carbon-Steel Bars for Concrete Reinforcement
 - 4. ASTM A767 - Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

5. ASTM A780 - Standard Practice for Repair of Damaged Hot-Dip Galvanized Coatings
 6. ASTM A970 - Specification for Welded or Forged Headed Bars for Concrete Reinforcement
 7. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete
 8. ASTM E329 - Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
- C. Concrete Reinforcing Steel Institute (CRSI) - Placing Reinforcing Bars
- D. American Welding Society (AWS) - AWS D12.1, Reinforcing Steel Welding Code for Reinforcing Steel.

1.03. SUBMITTALS

- A. Reinforcement Shop Drawing - Submit shop drawings in accordance with ACI 301, ACI 315, ACI 315R, and as modified below.
1. Shop drawings shall be clear enough so that every reinforcing bar in the structure can be located and shall be complete with all dimensions of the structure without the need to refer to the Contract Drawings.
 2. A reinforcing bar layout plan shall be provided for each slab or walkway level, and an elevation view reinforcing bar layout shall be provided for each wall.
 3. Shop drawings shall clearly indicate all construction joints, expansion joints, and control joints. Contractor shall coordinate with the reinforcement detailer so that all reinforcement interruptions and/or all splices can be shown and accounted for in the detailing.
 4. Reinforcement shall be shown as bent where needed to clear waterstops and/or maintain uniform cover. Bars with bends shall be indicated schematically on the plan and elevation views.
 5. All openings and pipe penetrations in walls and slabs shall be indicated on the reinforcement shop drawings (coordinated by Contractor). Formed openings larger than 1.25 times the rebar spacing in any direction shall be detailed with additional reinforcement around the opening in accordance with the Standard Detail on the Contract Drawings.
 6. Photocopies of Contract Drawings, in whole or in part, will not be acceptable.
 7. All re-submittals of shop drawings shall have all revisions/corrections clearly highlighted to the Engineer (e.g. labeled, clouded, etc.)
 8. Final corrected copies of shop drawings (for file and to be used in the field) shall be submitted a minimum of 14 days prior to start of installation.
 9. No reinforcing bar fabrication shall commence until shop drawings are approved.

10. All reinforcing bars shall be shop fabricated. No reinforcing bars shall be field bent.

- B. Mill test reports showing physical and chemical analysis shall be provided for Engineer's records.
- C. Submit catalog cut for threaded rebar splicing system.
- D. Submit catalog cut for mechanical rebar splicing system.
- E. Submit catalog cuts, clearly marked to indicate reinforcing bar supports and bolsters to be used for walls and slabs.

1.04. COORDINATION

- A. All construction joints, expansion joints, and control joints must be coordinated by the Contractor so that all reinforcement interruptions and/or splices can be shown.
- B. Contractor shall locate all wall/slab openings and pipe penetrations on the shop drawings prior to Engineer's review and approval.
- C. Required adjustments to reinforcing bars to accommodate cast-in (embedded) items shall be shown and detailed on the shop drawings.
- D. Contractor shall coordinate the supply of all bar supports and bolsters.

1.05. QUALITY ASSURANCE

- A. Reinforcement work shall conform to the applicable requirements of ACI 301, ACI 315, ACI 318, and CRSI referenced publications.
- B. All reinforcing bars shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type, and grade.
- C. All reinforcing bars 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.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Deliver reinforcing bars and accessory materials to the site in an undamaged condition.
- B. Reinforcement shall not be stored in direct contact with earth and shall be kept free of mud.
- C. Bundles of bars may be loaded in or on structures, providing the Contractor avoids premature loading or overloading of the structure. Surface protection from rust stains or damage shall be provided by the Contractor.
- D. Equipment for handling galvanized reinforcing bars shall have protected contact areas. Bundles of coated bars shall be lifted at multiple pick-up points to minimize bar-to-bar abrasion from sags in the bundles. Coated bars shall be stored on protective cribbing.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Deformed Reinforcing Bars - ASTM A615, Grade 60.
- B. Welded Wire Reinforcement (WWR) - ASTM A185 for plain wire and ASTM A497 for deformed wire, supplied in flat sheets only.
- C. Galvanized (Zinc-Coated) Reinforcing Bars - ASTM A767, Grade 60 deformed bars with Class I coating, galvanized after fabrication.
- D. Fiber Reinforcement - ASTM C1116, polypropylene fibers. Fibers shall be manufactured by Fibermesh Company, Grace Construction Products, or equal.
- E. Bar Supports and Bolsters
 - 1. Bar supports and bolsters shall be a non-bleeding and non-staining material where concrete surfaces remain exposed. Plastic, plastic tipped, or stainless steel bar supports shall be used for uncoated reinforcing bars. Galvanized reinforcing bars shall utilize bar supports and bolsters that are galvanized, coated with epoxy or another polymer, or made of plastic.
 - 2. Bar supports bearing on grade, insulation, or soft material shall be continuous runner type supplied with continuous welded on plates. Individual high chair supports will not be considered adequate.

Alternatively, minimum 4,000 psi precast concrete blocks specifically cast for proper support of reinforcing bars can be utilized. The use of pavers, brick, or concrete masonry units (CMU) to support reinforcement shall not be permitted.
- F. Expansion joint slip dowel and sleeve system shall be as specified in Section 03250, Concrete Finishes.
- G. Threaded rebar splicing system shall be a fabricated assembly with a flanged threaded mechanical splice capable of developing 125 percent of the specified yield strength (75 ksi for Grade 60 bars). Provide galvanized-coated flanged threaded rebar splicing systems where specifically indicated in the Contract Documents. Use Barsplice Products, Inc. "BPI Barsplicer System," ERICO "Lenton Form Saver," Dayton Superior "Threaded Splicing Systems," or equal.
- H. Mechanical bar splicing system for deformed rebar shall consist of lock-tightened shear bolts and special grip rails to mechanically splice rebar.

Use BarSplice Products, Inc. Zap Screwlok Type 2 (#3 bars or larger), SL Series (#4 bars or larger), or Transition (splice of different sized bars); Lenton Lock S or B Series (#4 bars or larger); Dayton Superior Bar Lock Splicing System D250SCA Bar Lock S/CA or L Series Couplers.

- I. Headed device in headed deformed bars shall conform to ASTM A970 including Annex A1 requirements for Class HA head dimensions. Use ButtonHead BNH System by BarSplice Products, Inc. or equal.

2.02. SOURCE QUALITY CONTROL

- A. Shop Inspection - The Engineer reserves the right to inspect the manufacturer's facilities while fabrication of reinforcing bars for this project is being performed.

PART 3 EXECUTION

3.01. ERECTION INSTALLATION APPLICATION

- A. Placement of reinforcement shall be in accordance with ACI and CRSI referenced publications.
- B. Reinforcing bars shall be spaced as shown on the approved shop drawings. Deviations with bars spaced up to 1.25 times the required spacing, necessary because of interference with inserts, conduits, piping, small openings for ducts, etc., are allowable as long as four consecutive bars average out to the required spacing.
- C. Where larger openings are encountered and reinforcing bars must be cut, equivalent splice bars (rounded bars) must be placed at each side of the opening plus #5 diagonal bars enveloping the opening at each corner (reference Standard Detail on Contract Drawings).
- D. Reinforcing bars shall be accurately located in forms and held in place before and during concreting by using supports of adequate strength and black annealed tie wire (#16 gage or heavier), to prevent bar displacement.
- E. Tie wires shall be bent into the wall or slab so as to not intrude into the reinforcement concrete cover space.
- F. Install bar supports and bolsters as specified in Part 2. Pavers, brick, or CMU supports shall not be permitted. Additional bar supports shall be installed to eliminate deflection of reinforcement.
- G. The minimum distance between non-lap spliced, parallel bars shall be two times the bar diameter, but in no case shall be less than 1 1/2 inches.

3.02. COVER

- A. Clear concrete cover shall conform to ACI 318 and ACI 350 unless noted otherwise.
- B. For structures exposed to earth, water, or weather (such as wet wells, channels, tanks, foundation walls, etc.), the clear cover shall be 2 inches (for severe exposure).
- C. The reinforcing bars of footings, base slabs, and other members in which concrete is deposited against the ground shall have 3 inches of concrete cover between it and the ground contact surface.

- D. Ends of reinforcing bars shall extend up to 2 inches from the outside face of the members into which they frame or terminate.

3.03. WELDED WIRE REINFORCEMENT

- A. Welded wire reinforcement shall be adequately supported, anchored, and tied integrally with the framework system to assure its final location in the slab. Lap the ends/edges of each sheet in accordance with CRSI procedures, but shall be lapped a minimum of 6 inches.
- B. The practice of "walking in" and placing the mats of reinforcement in freshly placed concrete will not be permitted.

3.04. FIBER REINFORCEMENT

- A. Concrete reinforced with fibers shall be used in concrete as indicated. Provide minimum 2 lbs. fibers per cubic yard of concrete unless indicated otherwise.
- B. If requested by the Engineer, the fiber manufacturer shall provide the services of a qualified representative for a pre-job meeting and initial job startup.

3.05. GALVANIZED REINFORCING BARS

- A. Galvanized reinforcing bars shall be fastened with galvanized, nylon, epoxy, or plastic-coated tie wire or other approved materials.
- B. Galvanized reinforcing bars supported from formwork shall rest on or be held in place with wire bar supports that are galvanized, coated with epoxy or another polymer, or made of plastic.
- C. Coating damage due to loading, shipment, and placing shall not exceed 2 percent of surface area. Damaged area greater than 2 percent of surface area shall deem the reinforcing bar unacceptable for use.
 - 1. Damaged areas shall be prepared and repaired with galvanized repair paint in accordance with ASTM A780.
 - 2. Repair field cut ends with zinc-rich coating used in accordance with manufacturer's recommendations.
- D. Galvanized reinforcing bars shall not be spliced or placed in direct contact with uncoated reinforcing bars.

3.06. DEVELOPMENT AND SPLICE LENGTHS

- A. All splicing of reinforcing bars shall be lap-spliced with bars placed in contact with each other and wired securely.
- B. Minimum lap splice or development length for reinforcing bars shall be as indicated on Contract Drawing S001. Special splices shown on the Contract Drawings, however, shall be lapped for the lengths indicated.

- C. Attention is directed to the fact that the top bars in beams or grade beams are required to extend one third of the span into the adjacent span (see typical bar placing diagram for beams). These top bars are not intended as splice bars, but are full value top reinforcement. The preferred placement is to have the required minimum space between all top bars. Bundling in pairs will be allowed if all the rules for bundled bars (per ACI 318) are met.
- D. Splices shall not be placed at points of maximum stress. However, in instances where they are unavoidable, the splice location in every second parallel bar shall be offset by alternating at least one and a half times the splice length.
- E. Base mat bottom bar splices shall not coincide with wall dowel locations. Offset adjacent bottom bar splices to avoid reinforcing bar congestion.
- F. Welding of reinforcing bars shall not be allowed unless specifically approved by the Engineer.
- G. Mechanical splice connections may be used for compression members (columns, etc.) only at locations approved by the Engineer and where new reinforcing bars are spliced with reinforcing bars in existing structures as indicated on the Contract Drawings. Square sawn ends are required for direct contact stress transfer in these devices.
- H. Observe the rules for staggering splices in accordance with ACI and CRSI.

3.07. FIELD QUALITY CONTROL

- A. The Contractor shall advise the Engineer of his intentions to place concrete at least 48 hours prior to concrete placement to allow for Special Inspections (as required) and observation of installed reinforcement and embedded accessories, including waterstops, keyways, and other items.
- B. Any repairs, corrections, cleaning, removal of debris, etc., shall be accomplished prior to start of concrete being placed.
- C. Reinforcement installed within wall forms and in any deep formwork shall be checked by the Contractor and verified by the Engineer before closing the form, as well as immediately prior to placing concrete.
- D. Prior to concrete deposition, reinforcement shall be free from mortar (concrete splash from previous placement), mud, loose mill and rust scale, grease, oil or any other coatings, including ice, that would reduce bond with the concrete.
- E. Where there is a delay in depositing concrete, reinforcement shall be rechecked and cleaned when necessary. Cleaning shall be done by whatever mechanical means is necessary to return it to an acceptable condition.

END OF SECTION

SECTION 03250

CONCRETE JOINTS AND ACCESSORIES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Concrete joints.
- B. Waterstop material.
- C. Sealant material for submerged joints in concrete.
- D. Miscellaneous joint accessories.
- E. Bonding agent.

1.02. SUBMITTALS

- A. Submit one-page catalog cuts for joint filler material and joint sealant, clearly indicating which item(s) are to be used.
- B. Submit one-page catalog cuts for waterstops and waterstop accessories, clearly indicating which item(s) are to be used.
- C. Submit one-page catalog cut for expansion joint slip dowel and sleeve system.
- D. Submit one-page catalog cut for bonding agent.
- E. Submit plan and elevation view(s) for each structure to show locations of all specified slab and wall joints as well as to show locations of additional joints proposed to facilitate construction. Coordinate with reinforcement shop drawings required per Section 03200, Concrete Reinforcement.

1.03. DELIVERY, STORAGE, AND HANDLING

- A. Store materials off the ground to provide protection from dampness and soil.

PART 2 PRODUCTS

2.01. TYPES OF JOINTS

- A. Construction Joint – The joint between two adjacent concrete placements, created by casting fresh concrete in contact with a previously cast (hardened) concrete. All typical reinforcement passes through the joint. A minimum of three days shall elapse between the casting of adjacent concrete placements for construction joints in liquid containment structures or as indicated on the Contract Drawings.

- B. Control Joint – A shrinkage-compensating joint with a groove formed or cut in the face(s) of the concrete member in order to cause a weakened plane, intended to crack. Only 50 percent of the typical reinforcement passes through the joint. In walls and slabs more than 14 inches thick, this joint is created similar to a construction joint. In walls and slabs 14 inches thick or less, this joint shall be created similar to a construction joint or can be cast as a monolithic placement.
- C. Isolation Joint – The joint between two adjacent concrete placements, created by casting fresh concrete adjacent to a previously cast (hardened) concrete placement, but separated by a joint filler material, to allow for expansion and contraction of concrete.
- D. Expansion Joint – A joint constructed similar to an isolation joint to allow for expansion and contraction of concrete, but a slip dowel (sleeved) passes through the joint to limit differential displacement.

2.02. MATERIALS

A. Joint Forming Materials

- 1. Construction and control joints for interruptions in concrete placement in tank base slabs, mat foundations, beam and slab systems, and walls shall be made from lumber with custom cut holes or slots to pass reinforcing bars through and with standard keyway (and waterstop if applicable). These “bulkheads” are to be securely fastened to the deck, wall, and/or beam forms. They shall be the same depth as the concrete section and produce dense, clean, straight edges (top, bottom, and sides) when stripped.
- 2. Construction joints for interruptions in non-structural slab-on-grade concrete placements shall be fabricated from either custom built lumber “bulkheads” or galvanized steel shaped to form a tongue-and-groove mechanical key joint with preformed knock out holes. The steel shaped unit shall be the same depth as the concrete, but shall terminate a minimum 1 inch below top surface.
- 3. Control joints for slab-on-grade construction shall be saw cut. Seal cut joints as specified in Section 07900, Joint Sealants.

B. Joint Filler Materials

- 1. Expansion joint filler material shall be performed, closed cell, high grade polyethylene or non-extruding PVC, such as “Expansion-Joint Filler” by BASF Chemical Company, “Plastic Expansion Board” by Westec Barrier Technologies, “Deck-O-Foam” by W.R. Meadows, Inc., or equal.
- 2. Isolation joint filler material shall be closed cell rigid foam, cork, or non-impregnated fiberboard.
- 3. The joint filler shall be compatible as a backup material, with regard to the sealant not bonding to or being stained by the backup. If the joint filler is a material that will bond to the sealant, non-bonding polyethylene strip shall be used to cover the back-up material.

C. Joint Sealants

1. Sealant for joints in concrete structures that either contain or hold out liquids (including groundwater) such as tankage, basements, flow channels, galleries, etc. shall be a two-component polyurethane material designed for submerged conditions.

Use Sika Corporation "Sikaflex-2c," Euclid Chemical Company "Eucolastic II," or equal.

2. Sealant for non-liquid conditions are as specified in Section 07900, Joint Sealants.

D. Expansion slip dowel and sleeve system shall consist of deformed or smooth steel dowel provided with a close fitting sleeve of plastic. The plain steel dowel shall conform to ASTM A572 or A588 with 50 ksi yield strength. The sleeve shall provide positive means to assure 1 inch free travel of the dowel after installation.

E. Waterstops for Use in Liquid Containment Structures (Tankage) and/or at Below-Grade Structures Intended to Hold Out Liquids

1. Waterstop material shall be PVC 6-inch by 3/8-inch ribbed center bulb waterstop "No. CR 6380 Wirestop" by Paul Murphy Plastics Company; "No. 705" by Greenstreak; or equal. Split units may be used instead of splitting the formwork.
2. For expansion joints, use PVC 9-inch by 3/8-inch ribbed center bulb (nominal 1 inch in diameter) waterstop "No. CR-9380 Wirestop" by Paul Murphy Plastics Company; "No. 718" by Greenstreak; or equal. Split units shall be provided where shown on the Contract Drawings and at other locations as needed.
3. As shown on the Contract Drawings, where new concrete is cast against hardened concrete:
 - a. Use a premolded 3/4-inch thick hydrophilic waterstop strip which expands on contact with water. Waterstop and primer shall be "Waterstop-RX" and "CetSeal" by CETCO Building Materials Group, "Swellstop" and "Swellstop Primer" by Greenstreak, or equal.
 - b. Use a special shape, bolt-on "retrofit," PVC waterstop set in epoxy adhesive against existing concrete and fastened down with stainless steel fasteners through stainless steel batten strips.
 - 1) In walls or slabs 15 inches or greater, use a bolt-on T-shaped waterstop with a nominal 3-inch stem. Use "Item #609" by Greenstreak, "Item RET638" by Vinylex, or equal.
 - 2) In walls or slabs less than 15 inches, use a bolt-on L-shaped waterstop with a nominal 3-inch stem. Use "Item #581" by Greenstreak, "Item KK611" by Vinylex, or equal.
 - 3) At expansion joints, use a bolt-on waterstop with a minimal 3-inch stem designed to allow for 1 inch of movement. Use "Item #667" or "Item 581" by Greenstreak or equal.

4. To provide continuity of waterstops in all applications where complete heat welding is not achievable, use a water-swelling sealant such as “Akwawell” by CETCO Building Materials Group, “Leakmaster” by Greenstreak, or equal.
- F. Waterstops for Use in Chemical Containment Structures
1. Waterstop material shall be thermoplastic elastomeric rubber 6-inch by 3/16-inch ribbed center bulb waterstop. Use products by Paul Murphy Plastics Company, Vinylex, Greenstreak, or equal. Split units may be used instead of splitting the formwork.
 2. For expansion joints, use thermoplastic elastomeric rubber 9-inch by 3/16-inch ribbed waterstop with center bulb (nominal 1 inch in diameter).
- G. Bonding Agent – Use a corrosion inhibiting, non-vapor barrier, extended open time bonding compound. Use Sika Corporation “Armotec 110 EpoCem,” BASF Chemical Company “Emaco P24,” Euclid Chemical Company “Duralprep A.C.,” or equal.

PART 3 EXECUTION

3.01. INSTALLATION OF CONSTRUCTION JOINTS

- A. Construction Joints in (Non-Structural) Slabs-on-Grade
1. Construction joints are placed in the slab where the concreting operations are concluded for the day in conformity with a predetermined joint layout (i.e., at location of control or isolation joints). If concreting is interrupted long enough at any time for the placed concrete to harden, a construction joint shall be used.
 2. If possible, construction joints should not be located nearer than 5 feet from any other joint to which they are parallel.
- B. Construction Joints in Tank Base Slabs and Mat Foundations
1. Slab construction joints shall conform to details and be placed at locations shown on the Contract Drawings or approved by the Engineer.
 2. The joint layout shall be shown on the reinforcement shop drawings.
 3. When slab placements must be terminated, construction joints shall be installed in advance of the day’s placement and shall be located at an approved construction joint location.
 4. Slab construction joints have 100 percent of the reinforcement passing through the joint.
 5. Waterstops shall be installed at all construction joints in tanks, flow channels, basements, etc., which are intended to hold liquid or keep areas dry. It is the Contractor’s responsibility to lay out the waterstops and assure continuity of intended design.

6. Construction joints shall be wetted immediately prior to concrete placement. Bonding agent shall not be applied on joints in liquid containment structures.
7. Joints shall be thoroughly vibrated during concrete placement.
8. Adjacent concrete sections shall not be cast against a concrete placement that is less than three days old.

C. Construction Joints in Walls

1. Wall construction joints shall conform to details and be placed at locations shown on the Contract Drawings or approved by the Engineer.
2. The joint layout shall be shown on the reinforcement shop drawings. At exposed areas, carefully incorporate joints into the concrete finish work.
3. When wall placements must be terminated, construction joints shall be installed in advance of the day's placement and shall be located at an approved construction joint or control joint location.
4. Wall construction joints have 100 percent of the typical horizontal and vertical reinforcement passing through the joint. All additional horizontal reinforcement (at top and base of walls) indicated in Standard Details on the Contract Drawings shall not pass through the joint.
5. Vertical construction joints require custom V-grooves on both faces as detailed on the Contract Drawings.
6. Waterstops shall be installed at all construction joints in tanks, flow channels, basements, etc., which are intended to hold liquid or keep areas dry. It is the Contractor's responsibility to lay out the waterstops and assure continuity of intended design.
7. Construction joints shall be wetted immediately prior to concrete placement. Bonding agent shall not be applied on vertical joints in liquid containment structures.
8. Joints shall be thoroughly vibrated during concrete placement.
9. Adjacent concrete sections shall not be cast against a concrete placement that is less than three days old.
10. After curing and finish, construction joint grooves shall be filled with approved backer rod and sealant.

D. Construction Joints in Suspended Slabs and Beams

1. Construction joints shall be located near the middle of spans of slabs, beams, or girders, unless indicated otherwise. Provisions shall be made for transfer of shear and other forces through construction joints by means of ledges, extended bars, dowels, etc.

2. Beams or slabs supported by concrete columns or walls shall not be cast or erected until concrete in the vertical support member has aged at least 24 hours. Beams shall be considered as part of a slab system and shall be placed monolithically therewith, unless indicated otherwise on the Contract Drawings.
3. Waterstops shall be installed in slab construction joints where the slab functions as a roof or cover over a building, gallery, or other area intended to be kept dry.

3.02. INSTALLATION OF CONTROL JOINTS

A. Control Joints in Slabs-on-Grade

1. Control joints in slabs-on-grade with a single layer of reinforcement shall be provided as shown on the Contract Drawings.
2. Joints shall be saw cut. Cutting shall be done as early as possible and within 24 hours after the concrete has set. (Wait just long enough that the blade does not ravel the edges of the fresh concrete.) The saw shall be guided to ensure straight cuts. The saw cut shall be a minimum of 1/8-inch wide and a set depth of 1-1/2 inches.
3. After curing, the joints shall be filled with approved backer rod and sealant as specified in Section 07900, Joint Sealants.

B. Control Joints in Walls

1. Wall control joints shall be placed at locations shown on the Contract Drawings.
2. In frost walls and corbels (masonry shelf) supporting masonry veneer, locate control joints to line up with masonry block control joints or brick expansion joints, respectively, as located on the Contract Drawings.
3. The joint layout shall be shown on the reinforcement shop drawings. At exposed areas, carefully incorporate joints into the concrete finish work.
4. Wall control joints have 50 percent of the typical horizontal reinforcement interrupted (alternating in each face) at the joint. In liquid containment structures, all the additional horizontal reinforcement indicated in Standard Details on the Contract Drawings shall not pass through the joint.
5. Vertical control joints require custom-formed sealant grooves on both faces as detailed on the Contract Drawings.
6. Control joints in walls more than 14 inches thick shall be constructed similar to a construction joint, but with only 50 percent of the reinforcement passing through the joint. Walls 14 inches thick or less can be cast monolithic with the custom-formed sealant grooves positioned on both faces.
7. Waterstops shall be installed at all control joints in tanks, flow channels, basements, etc., which are intended to hold liquid or keep areas dry. It is the Contractor's responsibility to lay out the waterstops and assure continuity of intended design.

8. Control joints shall be wetted immediately prior to concrete placement. Bonding agent shall not be applied on joints.
9. Joints shall be thoroughly vibrated during concrete placement.
10. Adjacent concrete sections shall not be cast against a concrete placement that is less than three days old.
11. After curing and finish, control joint grooves shall be filled with approved backer rod and sealant.

C. Control/Construction Joints in Concrete Topping

1. Concrete topping shall be detailed with proper construction and control joints. Joints in the topping shall be located directly over joints in the base slab and as indicated on the Contract Drawings.
2. Construction joint edges shall be compacted with a 1/8-inch radius edging tool.
3. Control joints shall be saw cut. Cutting shall be done as early as possible and within 24 hours after the concrete has set. (Wait just long enough that the blade does not ravel the edges of the fresh concrete.) The saw shall be guided to ensure straight cuts. The saw cut shall be a minimum of 1/8 inch wide and a depth of 1-1/2 inches.
4. After curing, the joints shall be filled with backer rod and sealant as specified herein.

3.03. INSTALLATION OF EXPANSION AND ISOLATION JOINTS

A. Expansion Joints in Walls and Slabs

1. Expansion joints shall conform to details and be provided as shown on the Contract Drawings.
2. Reinforcement or other items embedded in the concrete shall not pass through expansion joints. Ends of reinforcement shall be held back 2 inches from face of joint. Provide expansion dowels (slip dowel and sleeve system) as shown.
3. Install 9-inch waterstop in liquid containment structures and below-grade (dry) areas.
4. When casting up to an existing structure, or where indicated on the Contract Drawings, install a bolt-on retrofit waterstop that is designed to allow for 1-inch movement.
5. Dress edges of concrete corners to provide a smooth, uniform edge. Seal joints; both sides when accessible.

B. Isolation Joints for Slabs-on-Grade

1. Slabs-on-grade shall be separated structurally from other building elements to accommodate differential movement. Isolation joints shall be used where shown on the Contract Drawings.

2. Joint material shall be removed to the depth required for installation of sealant.

3.04. INSTALLATION OF JOINT ACCESSORIES

A. Waterstops

1. Waterstops shall be continuous through all slab and wall joints without interruptions to assure watertightness. Hold waterstop down 3 inches from the exposed top of walls not covered by a slab.
2. Waterstops shall be installed in accordance with the manufacturer's directions.
3. For PVC (and Thermoplastic) Waterstop Installation
 - a. Splices shall be made with heat welding or with splicing accessories - either method to follow manufacturer's recommendations. Where complete heat welding is not achievable, provide continuity by using a water-swelling sealant. The water-swelling sealant is to only supplement heat welding, not replace it.
 - b. The waterstop shall be securely wired in place 12 inches on center to preserve its position prior to and during the placement of concrete.
 - c. Thoroughly vibrate fresh concrete around waterstop during concrete placement.
4. For Bolt-On "Retrofit" Waterstop Installation
 - a. The existing concrete surface shall be prepared by abrasive blasting or grinding and washing prior to installation.
 - b. Set bolt-on retrofit waterstop in a bed of epoxy adhesive and fasten down to concrete surface with stainless steel batten bars and concrete fasteners, as required per manufacturer's installation requirements.
 - c. Follow the same splicing procedures as for PVC waterstop installation.
5. Hydrophilic waterstops shall be installed in accordance with the manufacturer's directions. As required, the surface shall be prepared by grinding and washing. The recommended primer/adhesive shall be applied immediately prior to the installation of hydrophilic waterstop.

B. Sealant

1. Sealant shall be installed in accordance with the manufacturer's instructions. Primer shall be applied as recommended by the manufacturer.
2. Sealant depth (at midpoint) shall be appropriate for the joint width.
 - a. The sealant depth shall be controlled by the use of joint fillers or back up materials. The backup material shall be non-impregnated and compressible; such as backer rod.

- 1) Backer rod shall be about 1/8 inch larger in diameter than the width of the joint to allow for compression.
 - 2) Where the depth of the joint does not permit the use of backer rod, a bond breaker (polyethylene strip) must be used to prevent bonding to the back of the joint.
- b. Joint fillers shall be held back for sealants. Where joint filler is flush with the adjacent concrete, enough filler material shall be removed so the joint can be sealed to the specified depth.

JOINT WIDTH AND SEALANT DEPTH	
JOINT WIDTH (INCHES)	SEALANT DEPTH AT MIDPOINT (INCHES)
1/4 to 1/2	1/4
1/2 to 1	3/8 to 1/2
1 to 2	1/2

3. Sealant shall be applied to both sides of all joints where accessible, but shall not be installed prior to successful liquid tightness (leak) testing where applicable.
- C. Bonding Agent - Prior to placing fresh concrete against existing hardened concrete, apply a bonding agent.
1. Apply bonding agent for toppings, equipment/ housekeeping pads, and patches.
 2. Do not apply bonding agent on control joints.
 3. Do not apply bonding agent on control joints.
 4. Do not apply bonding agent on vertical construction joints in liquid containment structures.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01. SCOPE OF WORK

- A. It is the intent of these specifications to produce high quality, dense, durable, watertight (if applicable) concrete. The Contractor will be responsible for the final in-place concrete quality. Care shall be taken in development of mix designs and during mixing, placing, curing, and finishing to achieve the desired end result. The Contractor will be responsible to repair leaks (if applicable), cracks, unsound concrete, and poor finishes to the satisfaction of the Owner, at no additional cost.
- B. Section includes:
 - 1. Concrete mix design requirements.
 - 2. Placement and care of concrete.
 - 3. Restrictions regarding embedments in concrete.
 - 4. Concrete testing.
 - 5. Concrete repair (of newly cast concrete).

1.02. REFERENCES

The publications listed below form a part of this specification.

- A. American Concrete Institute (ACI)
 - 1. ACI 201.1 - Guide for Conducting a Visual Inspection of Concrete in Service
 - 2. ACI 211.1 - Selecting Proportions for Normal, Heavyweight, and Mass Concrete
 - 3. ACI 301 - Specifications for Structural Concrete
 - 4. ACI 302.1 - Guide for Concrete Floor and Slab Construction
 - 5. ACI 304 - Measuring, Mixing, Transporting and Placing Concrete
 - 6. ACI 305R - Hot Weather Concreting
 - 7. ACI 306R - Cold Weather Concreting
 - 8. ACI 309 - Guide for Consolidation of Concrete
 - 9. ACI 318 - Building Code Requirements for Structural Concrete

10. ACI 350R - Code Requirements for Environmental Engineering Concrete Structures
- B. American Society for Testing and Materials (ASTM)
 1. ASTM C31 - Making and Curing Concrete Test Specimens in the Field
 2. ASTM C33 - Concrete Aggregates
 3. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens
 4. ASTM C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 5. ASTM C94 - Ready-Mixed Concrete
 6. ASTM C138 - Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
 7. ASTM C143 - Test Method for Slump of Hydraulic-Cement Concrete
 8. ASTM C150 - Portland Cement
 9. ASTM C172 - Sampling Freshly Mixed Concrete
 10. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method
 11. ASTM C260 - Air-Entraining Admixtures for Concrete
 12. ASTM C295 - Petrographic Examination of Aggregates
 13. ASTM C311 - Sampling and Testing Fly Ash or Natural Pozzolans for Use in Concrete
 14. ASTM C457 - Determination of Air Voids in Concrete
 15. ASTM C494 - Chemical Admixtures for Concrete
 16. ASTM C595 - Specification for Blended Hydraulic Cements
 17. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 18. ASTM C948 - Density, Water Absorption, and Apparent Porosity of Glass-Fiber Reinforced Concrete
 19. ASTM C989 - Ground Granulated Blast-Furnace Slag for Use in Concrete
 20. ASTM C1116 - Fiber-Reinforced Concrete and Shotcrete
 21. ASTM C1218 - Test Method for Water-Soluble Chloride in Mortar and Concrete
 22. ASTM C1260 - Test for Alkali Reactivity of Aggregates

1.03. SUBMITTALS

- A. Qualifications statement regarding batch plant certification.
- B. Prior to submittal of concrete mix designs, submit data on all ingredients to be used in the mix designs for pre-approval. All data shall be dated within the last 12 months.
 - 1. Certified mill tests of cementitious materials (cement, fly ash, and slag).
 - 2. Certified tests of fine and coarse aggregates meeting requirements in Part 2 of this specification.
 - 3. Verification of fine and coarse aggregates' potential for alkali-aggregate reactivity provided by one or more of the following:
 - a. Certified testing of aggregates for alkali-aggregate reactivity potential.
 - b. Identification by State DOT for "ASR potential."
 - c. Certified statement from source of aggregates pertaining to history of alkali-aggregate reactivity.
 - 4. Catalog cuts of concrete admixtures,
- C. Concrete Mix Designs - Concrete mixes used on this project shall be either established mixes verified by "Field Test Data" or new custom laboratory designed "Trial Mixtures." Requirements for either option are as follows.

All test data shall be dated within the last 12 months. Partial submittal will not be reviewed.

- 1. List amount and sources of mix ingredients:
 - a. Cement.
 - b. Pozzolans (fly ash and slag).
 - c. Fine aggregate.
 - d. Coarse aggregate.
 - e. Water.
 - f. Admixtures.
 - g. Fibers (if required).
- 2. Strength Test Reports - The average strengths shall be higher than the required average compressive strengths (f_{cr}) as per ACI 301, paragraph 4.2.3.3. Concrete supplier shall perform calculations validating proposed concrete strengths.

3. Typed letter signed by an official from concrete supplier stating that all materials for proposed mix are identical (from the same source and of the same amounts) as materials used for concrete mix in the submitted strength test reports.
 4. Certified test for amount of water-soluble chloride ion (CL-) in concrete.
- D. Submit catalog cut for retarding admixture.
 - E. Submit catalog cut for surface-applied hot weather evaporation reducer.
 - F. Submit a filled-in sample batch plant ticket prior to the first concrete placement. Reference batch ticket requirements in Part 3 of this specification.
 - G. Submit special requests for embedment of conduit, etc. Reference restrictions in Part 3 of this specification.
 - H. If concrete repairs are needed for newly cast concrete as indicated in Part 3 of this specification, the Contractor shall submit proposed repair products and procedures specified in Section 03732, Concrete Repair.

1.04. COORDINATION

- A. Coordinate all concrete placements with work (general, site/civil, architectural, structural, electrical, HVAC, instrumentation, mechanical, plumbing, etc.) indicated in all specifications and on all Contract Drawings.
- B. Coordinate concrete placement with rock blasting restrictions.
- C. Coordinate installation of all cast-in (embedded) items (i.e., grating frames, hatches, anchor rods, etc.) prior to start of concrete placement. Post-installation of cast-in items into new hardened concrete is not allowed.
- D. Coordinate all concrete placements with testing and inspection requirements specified herein and identified in Section 01420, Special Inspections.
- E. Obtain approval on Contractor's proposed curing and protection plan prior to placement of any concrete. Reference Section 03370, Concrete Curing and Protection.

1.05. QUALIFICATIONS

- A. The concrete batch plant providing concrete to this project shall be certified by the State DOT.

PART 2 PRODUCTS

2.01. CONCRETE

- A. Concrete Classes and Their Use
 1. Mix A - All general uses not otherwise specified or provided for below.

2. Mix B - Liquid Containment Structures - All structural reinforced concrete in contact with process water.
3. Mix C - Concrete fill/topping (average thickness greater than 3 inches), pipe supports and encasements, and ductbanks.
4. Mix D - Concrete thrust blocks (below grade), and fill concrete below structures.
5. Mix E - Exterior slabs, platforms, walkways, sidewalks, road curbs, and truck unloading containment pads.

Mix	28-Day Compressive Strength (psi)	Coarse Aggregate Size per ASTM C33	Minimum Total Cementitious Content (lbs/CY)	Maximum Water/Cement Ratio (w/c) ⁽¹⁾	Air Content % ⁽²⁾	Maximum Water-Soluble Chloride Ion (CL ⁻)
A	4,500	#57	575	0.44	6.0	0.30
B	4,500	#57	575 ⁽³⁾	0.42	6.0	0.10
C	4,000	#7	550	0.45	7.0	0.15
D	3,000	#467	425	0.50	6.0	0.30
E	5,000	#57	600	0.40	6.0	0.15

⁽¹⁾ These maximum water/cement ratios shall be considered for selection of supplier's mix designs. The water/cement ratio specified in the approved mix designs shall be the maximum used in production.

⁽²⁾ Tolerance for air content is +1-1/2 percent.

⁽³⁾ Fly ash content shall be 15 to 25 percent of total cementitious content. As an alternate to fly ash, use slag at 30 to 50 percent of total cementitious content. Maximum total cementitious content shall not exceed 660 lbs/CY.

B. Air Entrainment Requirements

1. All concrete exposed to weather or liquid shall be air-entrained as specified in the above chart.
2. For interior concrete, where finishes require a lower air content than specification requires, the air content shall be adjusted accordingly with the approval of the Engineer.

C. Concrete Slump

1. Without plasticizers, concrete slump for flatwork shall not exceed 3 inches. Wall concrete, columns, and deep beams (without plasticizers) shall be placed with a maximum slump of 4 inches.
2. Concrete with superplasticizer shall be designed for a target slump of 6 inches. Mixed concrete with a slump greater than 8 inches shall not be placed on this project.

2.02. MATERIALS

A. Cement

1. Cement shall be Portland cement Type I or Type II and shall meet the requirements of ASTM C150.

If aggregates are susceptible to alkali-silica reactivity (ASR), cement shall be low alkali containing less than 0.60 percent of equivalent alkalies ($\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$) per ASTM C150, Table 2 unless other approved measures are included to mitigate ASR. Low alkali cement shall be tested frequently during construction, as outlined in Part 3, to monitor alkali levels.

2. If Type II cement is available, use for below-grade construction and for liquid containment structures or when air temperatures at the time of placement are expected to exceed 80 degrees F.
3. High early-strength cement (Type III with a maximum tri-calcium aluminate (C3A) content of 8 percent) shall only be used with advance written approval by the Engineer. Note that Type III cement would not be allowed for Mix B concrete.

B. Pozzolans

1. Mix B concrete and all concrete mixes utilizing aggregates with ASR potential shall contain pozzolans. (Reference the mix design chart above.)
2. Fly ash shall meet the requirements of ASTM C618 Class F except as modified below:
 - a. Loss of Ignition, Maximum - 5.0 percent.
 - b. Maximum Retained on #325 Sieve - 30 percent.
3. Blastfurnace slag material shall meet the requirements of ASTM C989. A blend of Portland cement and blastfurnace slag shall meet the requirements of ASTM C595 and be specifically manufactured to produce higher concrete strengths and provide greater resistance to chloride penetration and sulfate attack.

C. Aggregates

1. Fine Aggregate (Sand)
 - a. Natural or manufactured siliceous sand.
 - b. Quantity of deleterious substances limited by Table 1 of ASTM C33.
 - c. Graded within the specified limits of ASTM C33.

2. Coarse Aggregate
 - a. Crushed stone or crushed gravel.
 - b. Quantity of deleterious substances limited by Table 3 of ASTM C33 for Class 4S aggregates.
 - c. Graded within the specified limits of ASTM C33.
3. Five cycle soundness tests for fine and coarse aggregates shall meet the requirements of ASTM C33.

PERCENT LOSS

	MAGNESIUM SULFATE	SODIUM SULFATE
Fine Aggregate ⁽¹⁾	15	10
Coarse Aggregate ⁽²⁾	18	12

- (1) If provided results of soundness tests exceed these limits, it would be acceptable to provide a certified letter attesting to the favorable performance of the fine aggregates as outlined in ASTM C33, Article 8.
 - (2) Soundness tests for coarse aggregates do not need to be provided if they are approved by State DOT for use with concrete. Submit verification of such.
4. Source of fine and coarse aggregates shall not have a history pertaining to alkali-aggregate reactivity. In the event that aggregate source with potential alkali-aggregate reactivity is unavoidable, at least two of the following measures shall be taken to minimize this reaction:
 - a. Provide low alkali cement.
 - b. Use fly ash (minimum 20 percent content) or slag.
 - c. Use lithium-based additives (proven to be effective based on testing of concrete).

D. Mixing Water - Clear and potable.

2.03. ADMIXTURES, ETC.

- A. General Requirements - Admixtures other than those specified may only be used after written approval by the Engineer.
 1. Admixtures shall be as manufactured by Master Builders Solutions (BASF Chemical Company); Sika Corporation; Euclid Chemical; Grace Construction Products; or equal.
 2. All admixtures proposed shall be selected in advance so that the appropriate trial mixes can be made.

3. After material sources have been established and approved, these sources shall not be changed for the duration of the project.
 4. The Engineer may require that a field representative of the admixture manufacturer provide occasional service in the field or batch plant to assure proper use of the admixture.
- B. Air entrainment admixture shall meet the requirements of ASTM C260.
- C. All concrete mixes shall contain a "water-reducing admixture" that meets the requirements of ASTM C494 Type A or a "high range water-reducing admixture" (superplasticizer) that meets the requirements of ASTM C494 Types F or G. These admixtures shall not contain chlorides.
- D. Retarding Admixture - If air temperatures are expected to exceed 85 degrees F during the placement and/or finishing of any flatwork, a retarding admixture shall be used that meets the requirements of ASTM C494 Type D.
- E. Evaporation Reducer - For all concrete flatwork during hot and/or windy weather conditions, apply to freshly placed concrete prior to finishing. Use BASF Chemical Company "Confilm," L&M Construction Chemicals "E-Con," Conspec (by Dayton Superior) "Aquafilm," or equal.
- F. Acceleration admixtures associated with cold weather concrete shall meet the requirements of ASTM C494 Type C and shall not contain calcium chloride. (Reference Section 03370, Concrete Curing and Protection, for cold weather protection procedures.) Note that acceleration admixtures are not allowed in Mix B for liquid containment structures. Approval from Engineer shall be obtained prior to use.

PART 3 EXECUTION

3.01. PREPARATION, MIXING, AND HANDLING OF CONCRETE

- A. Batch Plant Requirements - Measurement of materials at the batch plant shall be in accordance with ASTM C94.
- B. The batch plant used to supply concrete for this project shall meet the following requirements:
1. Weight Hoppers - The plant shall have separate weight bins for cement and aggregate.
 2. Scales - Shall measure the actual weight within an accuracy of 0.1 percent of full scale or one graduation, whichever is less. Scales shall be sealed annually by the Official Sealer of Weights and Measures.

3. Heating and Cooling of Materials

- a. In cold weather, the batch plant shall be equipped to heat aggregates and water to produce concrete delivery temperatures at the project site greater than the minimum temperatures indicated below. Aggregates shall not contain ice or have frozen lumps nor shall they be heated to a temperature over 120 degrees F.
 - 1) When ambient air temperature at time of placement is above 30 degrees F, concrete temperature must be at or above 55 degrees F.
 - 2) When ambient air temperature at time of placement is below 30 degrees F, concrete temperature must be at or above 60 degrees F.
 - 3) When ambient air temperature at time of placement is below 0 degrees F, concrete temperature must be at or above 65 degrees F.
- b. In warm weather, the batch plant shall be equipped to cool water with ice, and cool aggregates by shading and spraying with cool water, to obtain concrete delivery temperatures at the project site of no greater than 95 degrees F. The Contractor shall take into account drive time, slump loss, admixtures, flash set, etc. and reduce delivery temperatures as appropriate.

4. Moisture Content - The automated batch plant shall adjust aggregate weights dispensed based on their moisture content.

C. Mixing Methods

1. All concrete shall be ready mixed and meet the requirements of ASTM C94.

The truck mixer shall be equipped with a water tank for carrying mixing water. Water added to the mixer shall be measured to the nearest gallon by use of a water meter. For all trucks arriving on site without an operating water meter, water shall only be added manually into the back of the truck using a calibrated container. Water carried within the truck water tank shall not be used unmetered.

Water can be added to the mixer to attain initial slump, but only within the limits of the specified water/cement ratio. After addition of water, the concrete shall be mixed at least 30 revolutions in the mixing speed range.

Mixers shall meet the requirements of the "Truck Mixer and Agitator Standards" Truck Mixer Manufacturer's Bureau and shall bear their certification plate.

Trucks shall be equipped with a revolution counting device.

2. A written delivery slip or ticket, prepared and signed by the plant operator shall be made out at the proportioning plant for each truck load batch. The delivery slip shall be given to the Engineer as soon as the truck arrives at the job site, and each slip shall show the following information, which represents actual quantities of batched materials in each truck:
 - a. Truck number.
 - b. Date and time truck is batched.
 - c. Ticket number.
 - d. Mix designation of concrete.
 - e. Cubic yards of concrete.
 - f. Cement type and weight in pounds.
 - g. Weight in pounds of each size and type of aggregate.
 - h. Admixtures, weights in pounds and ounce.
 - i. Moisture content of fine and coarse aggregates.
 - j. Water added to the batch at the plant.
 - k. Water added to the batch during transport from plant to job site.
 - l. Water added to the batch at the job site.

The driver and/or testing laboratory technician shall record the number of gallons of water added during transport and at the job site. If no additional water is added, this shall be clearly indicated on the batch tickets. In no case shall the water/cement ratio be exceeded.

Any truck delivering concrete to the job site without a delivery slip will be rejected and shall immediately depart from the job site.

3. After completion of mixing, discharging may begin immediately, otherwise the mixer shall be revolved at the agitating speed.

The total time interval from when the cement makes contact with the aggregates to the completion of discharge shall not exceed 90 minutes. The Engineer may reduce the total time limit in hot weather or under unusual conditions if unsatisfactory results are obtained.

4. Mixing at the Construction Site - If the time limits specified cannot be consistently achieved by mixing at the plant or in transit, concrete shall be mixed completely in the truck mixer following the addition of the mixing water at the point of deposition.

Trucks shall be loaded first with coarse and fine aggregates and admixtures during which time the drum may be revolved or rocked. Cement shall be added last and the drum shall remain stationary after the cement is added until water is added at the project site.

Mixing shall begin at the project site after the addition of water and shall continue for a minimum of 100 revolutions or until a uniform mix has been produced. Mixing time shall not exceed 15 minutes.

The entire load shall be discharged within 30 minutes after mixing has been completed.

3.02. EMBEDMENTS IN CONCRETE

- A. Embed no pipes other than electrical conduit in structural concrete.
- B. Obtain approval from Engineer for any variation from the following requirements unless shown on the Drawings. Make request in writing accompanied by suitable sketch.
 - 1. Do not cut or displace any reinforcement.
 - 2. Do not place conduit between concrete surfaces and reinforcement.
 - 3. Restrict O.D. of conduit to 1/4 of slab thickness. Keep within middle half of that thickness.
 - 4. Any bundle of conduits shall not exceed a diameter equal to 1/4 of slab thickness.
 - 5. Place unbundled, parallel conduits at least 6 inches apart.
 - 6. Conduits that cross must be bent such that they cross between 45 and 90 degrees from each other.
 - 7. Conduits that cross can touch each other, but no more than three conduits (not exceeding total height of 1/3 of slab thickness) can cross at any given location.
 - 8. Conduits that run parallel with any reinforcement shall be kept a minimum of 2 inches clear from that reinforcement.
 - 9. Do not embed conduit in beams.
 - 10. Total conduit cross sectional area embedded in columns shall be less than 4 percent of the gross concrete area of columns.

3.03. CONCRETE PLACEMENT

- A. The Contractor shall notify the Special Inspector (when required), Engineer, and testing lab a minimum of 48 hours in advance of placement to allow sufficient time for scheduling and observation of the work and for any corrective measures which are subsequently required.

B. Preparation

1. Concrete shall not be placed until all reinforcement is secured in position, nor until the forms have been completely installed and cleaned of debris; coated; form ties retightened; all sleeves, castings, pipe, conduits, anchors, forms for openings have been placed and anchored by the Contractor, nor until all water, snow, and ice have been removed from the space to be occupied by the concrete.
2. Finishing installation of reinforcing and finalization of formwork concurrent with starting of concrete placement is not acceptable.

C. All porous soil or concrete surfaces against which new concrete is to be placed shall be wetted down and dampened prior to placement. Spraying from the concrete truck hose immediately prior to placement will not be considered sufficient.

D. Concrete shall be placed in accordance with ACI 302, ACI 304, and ACI 318.

E. Concrete shall be conveyed as rapidly as practicable to the point of deposit by methods which prevent the separation or loss of the ingredients.

F. Any concrete being placed shall not be allowed to free fall more than 5 feet as measured from the point of discharge to the bottom of the formed surface. All distances greater than 5 feet shall utilize elephant trunks with hoppers.

G. When placing concrete, sufficient illumination shall be provided in the interior of the forms so that the concrete, at places of deposit, is visible.

H. Concrete shall be placed and vibrated in layers not to exceed 30 inches. Reference ACI 309.

I. Vibration shall be applied directly to the freshly-placed concrete by successive vertical penetrations of the vibrator. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures.

"Pencil" vibrators shall be on hand and utilized where required.

Vibration shall be supplemented by forking or spading by hand in the corners of forms.

When vibrating structural slabs, the vibrator must not ride the form supporting the slab.

Since the duration of vibration required is dependent on the frequency, size of vibrator, and slump of concrete, the length of time must be determined in the field.

Vibrators shall not be used to move concrete laterally within the forms.

J. Place concrete continuously and at full depth of slabs (so as not to permit cold joints) between predetermined expansion, construction, or control joints.

3.04. PUMPING CONCRETE

A. Pumping Concrete - If the pump operator does not have direct visual contact with the location of concrete placement, two-way radio communications shall be provided.

3.05. EQUIPMENT AND HOUSEKEEPING PADS

- A. The General Contractor shall provide minimum 4-inch high concrete pads for all mechanical, plumbing, HVAC, and electrical equipment. If greater thicknesses are shown on the Contract Drawings or required by the equipment being installed, provide thickness required.
- B. Verify all concrete pad sizes, locations, and anchors with various Contractors. If sizes are not dimensioned on the Contract Drawings, provide concrete pads 6 inches wider than the equipment in each direction.
- C. Prior to placing concrete pads, use a bonding agent.

3.06. CONCRETE TOPPINGS (TYPE G FINISH; REFERENCE SECTION 03350, CONCRETE FINISHES)

- A. Where concrete toppings are indicated on the Contract Drawings, use Mix C or Mix CF concrete as applicable.
- B. At new construction, finish the slab with a Type A scratched finish. Precede the concrete topping with an application of a bonding agent.
- C. At existing concrete slabs, the slab shall first be abrasive blasted. Apply a bonding agent prior to placement of the concrete topping.

3.07. CONCRETE FINISHING

- A. All flatwork concrete shall be finished immediately after placement per Section 03350, Concrete Finishes.
- B. All formed concrete shall be finished after form removal. Coordinate timing of form removal within the seven-day rubbed finish requirements per Section 03350, Concrete Finishes.

3.08. CONCRETE CURING AND PROTECTION

- A. All concrete shall be cured (and protected from hot or cold weather conditions) for a minimum of seven days. Submittal of proposed procedures is required; follow requirements of Section 03370, Concrete Curing and Protection.

3.09. LIQUID TIGHTNESS TEST

- A. Liquid containment structures shall be tested for liquid tightness per Section 03301, Liquid Tightness Test For Concrete Structures.

3.10. INCOMPLETE STRUCTURES

- A. Structures which are incomplete may not be capable of withstanding backfill, hydrostatic, surcharge, storage and other permanent or temporary loading conditions imposed during construction. Control of such loading conditions shall be the sole responsibility of the Contractor.

3.11. TESTING FOR QUALITY ASSURANCE

- A. The Owner will hire and pay for the services of an independent testing laboratory to perform the testing for quality assurance. Field testing shall consist of w/c ratio verification, temperature, slump, air content, density, and tests for the compressive strength. These test results shall be used by the Contractor to assist his control of quality in order to meet specified values. Additional testing for materials verification (including fine and coarse aggregate moisture content and water absorption, etc.) shall be conducted as directed by Engineer.

Contractor shall accept the reported results from this independent testing laboratory. If Contractor is in contention with any of these results, Contractor is allowed to hire their own independent testing laboratory to perform additional testing. Contractor's costs of other independent testing laboratory will not be recompensated, regardless of test results.

- B. Testing will be required for each placement in excess of 5 cubic yards.
- C. Location of Field Tests - All sampling for field tests (cylinders, air content, slump, etc.) shall be performed at the delivery truck to allow proper correlation of the tests.

When concrete is being pumped, additional air content testing shall be performed at the pump discharge to monitor air content changes through the pump and to maintain specified air content at location of concrete placement.

- D. The following field tests will be performed by the testing laboratory for every concrete placement:
1. Water/Cement Ratio (Calculated Method)
 - a. The water/cement ratio shall be calculated and recorded for each truckload of concrete delivered to the job site. This calculation shall account for all moisture in the mix including wash water, water added during transport and at the job site, and free moisture in both fine and coarse aggregates.
 - b. Concrete which exceeds the water/cement ratio specified in the approved mix design shall not be utilized.
 2. Temperature - Shall be recorded by the testing laboratory for each batch of concrete delivered to the project.
 3. Slump Test - Slump tests shall be made in the field by the testing laboratory on each batch of concrete produced, in accordance with ASTM C143.
 4. Air Content Test (Fresh Concrete)
 - a. Test for entrained air content in accordance with ASTM C231. Concrete which does not contain the proper amount of entrained air shall not be utilized under this contract.

- b. A minimum of two tests will be required for each day of operations. Also, at least one test shall be made for each 50 cubic yards and each class of concrete placed within a single day.
 - c. If concrete is being pumped, a test shall be performed at both the truck and the end of the pump discharge. These two tests shall be used to monitor the drop in air content due to pumping and to better regulate the air content in forthcoming concrete batches.
 - d. In the event that test results are outside the limits specified, additional tests shall be required to show that concrete meets the specification requirements or the concrete shall not be used on this project. These additional tests shall be paid for by the Contractor.
5. Unit Weight (Density) - The unit weight of the fresh concrete shall be measured in accordance with ASTM C138. The unit weight shall be recorded at the same interval as required for air content testing as stated above.
6. Compressive Strength Test

- a. Samples of concrete will be taken and tested by the testing laboratory for compressive strength in accordance with ACI 301; ASTM C31, C39, and C172; except as modified herein.

At least one sampling will be taken for each 50 cubic yards of each class of concrete placed within a single day. No more than one sampling may be taken from a single batch to satisfy this requirement.

One sampling shall consist of four 6-inch diameter test cylinders. One cylinder will be tested at 7 days, and 2 cylinders tested at 28 days, and 1 held for testing at 56 days as needed.

Each cylinder will be identified by a tag, furnished by the Contractor, which will be hooked or wired to the side of the container.

It is the Contractor's responsibility that cylinders be stored in a temperature-controlled curing box, provided by the Contractor on the construction site, for 24 hours after they have been molded and held at a temperature between 60 degrees F and 80 degrees F. Provide a high/low thermometer to verify temperature range.

After 24 hours, the testing technician will transport the samples to the laboratory for moist curing until tested.

- b. When field temperatures during the 24 hours immediately preceding the time of concrete placement have exceeded 85 degrees F, or have been less than 40 degrees F, or when freezing, hot weather, or other extraordinary field curing conditions are anticipated, or when requested by the Engineer, four additional cylinders shall be molded at each sampling for field curing.

These additional cylinders shall be located by the Contractor to be cured at the structure as near to the point where the sampled concrete was placed as practicable. These cylinders shall receive the same protection and be subject to the same environmental conditions as that portion of structure for periods of 5, 21, and 49 days from the date of molding.

The additional field-cured cylinders shall thereafter be transported to the laboratory and stored at laboratory room temperature and conditions for additional days until tested. One specimen tested at 7 days, 2 at 28 days, and 1 held for testing at 56 days if needed.

Note: 7- and 28-day laboratory cured specimens continue to be required as control specimens. Field-cured specimens will also be considered for concrete acceptance.

- c. After job site storage, concrete test cylinders shall be transported in rigid boxes specifically sized and constructed to prevent specimens from becoming damaged from tipping, falling, rolling, or bumping.
- d. After a mean value of a ratio between 7-day and 28 day strengths has been established from 10 or more samplings the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths.

Thereafter, should a 7-day test strength from any sampling (laboratory cured) be more than 10 percent lower than the 7 day strength which corresponds with the specified 28 day compressive strength, the Contractor shall:

- 1) Immediately provide an additional seven days of curing in the affected area from which the deficient test cylinders were taken.
 - 2) Correct the mix for the next concrete placement.
- e. From laboratory cured specimens, the strength level of concrete will be evaluated for acceptance based on criteria in ACI 301, Chapter 17. Concrete is considered satisfactory if all of the following conditions are satisfied:
 - 1) The average of 28-day cylinder tests for any three consecutive sets shall meet or exceed the strength required for the mix specified.
 - 2) No more than 10 percent of the compressive strength test results from individual specimens shall have strengths less than that specified.
 - 3) No single set of compressive strength test results falls below the specified strength by more than 500 psi.
 - f. The Contractor can request additional field-cured cylinders to verify adequate concrete strengths for early formwork removal. The Contractor shall reimburse the Owner for the testing of these additional cylinders.

- g. In the event that the above conditions are not met and there is reason to imply that the low compressive strength results reflect actual concrete strength in the structure, additional tests shall be performed as outlined in Article 3.13.
- E. The following additional tests will be performed by the testing laboratory periodically as indicated, as directed by the Engineer:
 - 1. Aggregate Water Absorption - Prior to the first concrete placement, the testing laboratory shall obtain fine and coarse aggregate samples to determine and report water absorption. Aggregates shall be retested to adjust absorption values every 90 days until 95 percent of project concrete has been placed.
 - 2. Aggregate Moisture Content - At Engineer's discretion, the testing laboratory shall visit the batch plant and obtain samples of fine and coarse aggregates for the purpose of verifying actual moisture content as reported by the batch plant.
 - 3. Cement alkalinity (when low-alkali cement is used to mitigate ASR) - Prior to the first concrete placement, the testing laboratory shall obtain a cement sample to test for alkaline content. Testing laboratory shall report acceptability and conformance to requirements of ASTM C150 for ASR mitigation. Unless most current cement mill test reports are provided every 40 days, testing laboratory shall conduct additional sampling every 90 days until 95 percent of project concrete has been placed.
 - 4. Water/Cement Ratio (Microwave Drying Method)
 - a. At the discretion of the Engineer, water/cement ratio of fresh concrete may be verified by Microwave Drying Method.
 - b. Testing laboratory shall perform a microwave oven drying test every day in which 50 cubic yards or more concrete is scheduled to be placed. Testing shall be repeated throughout the day for every 50 cubic yards that is placed. Concrete discharge from truck and placement will not be held up pending results of initial testing.
 - c. The testing laboratory shall follow AASHTO Standard Test Designation T318-02, "Water Content of Freshly Mixed Concrete Using Microwave Oven Drying," to determine water content and w/c ratio.
 - d. Testing laboratory will provide a sample calculation worksheet to show calculations of water content (WC) and water/cement ratio with absorption of fine and coarse aggregates being taken into account. Testing laboratory shall provide immediate reporting to the Contractor and the Owner's representative, followed by a formal written report.
 - e. Concrete which does not meet specified water/cement ratio shall be rejected. When concrete is determined to not meet specifications, additional testing will be required on subsequent trucks arriving on site, and discharge will not be permitted until consistent satisfactory results are obtained.

5. Air Content Test (Hardened Concrete)

- a. The testing laboratory shall obtain core samples as directed by Engineer. The Contractor shall promptly assist testing laboratory by providing access, ladders, and/or scaffolding as needed to obtain samples. The testing laboratory shall core drill concrete and provide same-day patching of holes using non-shrink grout.
- b. Samples shall be obtained 14 days after placement (immediately following the 7-day wet cure and 7 day drying out).
- c. Hardened air content shall be determined in accordance with ASTM C457. Should any of these representative core samples show low air content, additional sampling and testing will be required and paid for by the Contractor. The Contractor will be responsible for replacement and/or corrective measures for concrete not meeting specification requirements.
- d. Three cores shall be obtained at each location as specified below. At base slab locations, the three cores shall be obtained at random throughout the slab. At walls, one sample shall be taken near the base of the wall, one at mid-height, and the third near the top of the wall. Wall samples are to be taken from the inside of the tank.

3.12. ADDITIONAL TESTING FOR CONCRETE ACCEPTANCE

- A. When unsatisfactory test results arise, additional tests as outlined below shall be provided and paid for by the Contractor.
- B. Inadequate Compressive Strength - In the event that test results fail to meet the strength requirements as outlined above, the Contractor shall be responsible for costs associated with having concrete core specimens obtained from the affected area and tested.

Three cores shall be taken for each sample in which the strength requirements were not met. The drilled cores shall be obtained and tested in conformance with ASTM C42 by the Owner's independent testing laboratory.

A core specimen shall be taken perpendicular to the concrete surface and shall be taken from near the middle of a unit of deposit when possible and not near formed joints or obvious edges of a unit deposit.

The diameter of core specimens should be at least 4 inches. The length of specimen, when capped, shall be at least twice the diameter of the specimen. Core specimens shall not include reinforcement. On the same day as they are drilled, core holes shall be repaired with non-shrink grout.

The core specimens shall be carefully handled while transported to the laboratory. Cores shall be tested and evaluated in accordance with ASTM C442 and ACI 301, Chapter 1.6.7.

1. The concrete in question will be considered acceptable if the average of three core specimen compressive strength tests meet or exceed 85 percent of the specified strength required for the specific concrete mix. No individual core compressive strength test result shall fall below 75 percent of the specified strength.
 2. Load Tests - If compressive strength requirements under the above procedure are not met by the results of core tests, then the Engineer may order load tests pursuant to ACI 318. Such tests shall be at the Contractor's expense.
- C. Non-Compliant Air Content - In the event that concrete placed by the Contractor is suspected of, or is tested and shown to not have proper air content or erratic air test results are obtained as specified above, the Contractor shall engage an independent testing laboratory to obtain and test samples for air content in accordance with ASTM C457 and to recommend modification to mix components or additives. The Contractor will be responsible for remediation to the satisfaction of the Engineer/Owner.

3.13. TEST REPORTS

- A. The testing laboratory shall provide a copy of field notes directly to Owner's on-site representative no later than the following day.
- B. Compressive strength test results shall be submitted to the Owner's on-site representative, Engineer, Contractor, and concrete supplier within 2 business days following 7-, 28-, and 56-day testing.

3.14. REPAIR OF NEWLY CAST CONCRETE

- A. Areas of concrete in which cracking, spalling, or other signs of deterioration develop during initial curing or thereafter until the end of the guarantee period shall be removed and replaced, or repaired in accordance with this Article and Section 03732, Concrete Repair.

The Contractor may propose to use a specific method most suitable to the situation and have the method approved by the Engineer prior to repair. The Contractor shall submit manufacturer's product data sheets and recommended application procedures to the Engineer for approval prior to performing repairs.

- B. Structural Cracks (as determined by Engineer) - Random shrinkage or structural cracks shall be repaired utilizing a low viscosity, 100 percent solids, two-component epoxy resin injection system as specified in Section 03732, Concrete Repair.
- C. Leaking and/or Active Cracks (That Are Not Structural Cracks) - Leaking and active cracks shall be repaired utilizing a low viscosity, hydrophobic, closed cell polyurethane foam injection system as specified in Section 03732, Concrete Repair.
- D. Excessive surface cracking in concrete slabs as defined herein shall receive a penetrating epoxy resin sealer to mend and seal the cracks as specified in Section 03732, Concrete Repair.

Excessive cracking shall be defined as areas containing "craze cracking" or "map cracking" as defined by ACI 201.1. In the event that excessive cracking occurs in isolated areas of a given concrete slab, sealer could only be required in the area of the cracks bounded by construction or control joints pending Engineer approval.

- E. Damaged (spalled, weakened, or disintegrated) concrete and areas of honeycomb shall be removed to sound concrete and shall be repaired in accordance with Section 03732, Concrete Repair.
- F. Substrength Concrete
 - 1. Concrete which fails to meet the strength requirements as outlined above in Article 3.13 will be analyzed by the Engineer as to its adequacy based upon design loading and exposure conditions for the particular area of concrete in question.
 - 2. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at his expense. The method of strengthening or extent of replacement shall be as defined by the Engineer.
 - 3. Concrete not requiring strengthening but still falling below the strength requirements, may be accepted by the Owner in accordance with the General Conditions, specifically the paragraph entitled "Acceptance of Defective Work."
- G. Inadequate Air Content - Concrete which will be exposed to freeze-thaw cycles when in service, and which is found to have inadequate air content, shall be replaced to the extent defined by the Engineer.

END OF SECTION

SECTION 03350

CONCRETE FINISHES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Concrete finishes.
- B. Sample wall finish requirements and approvals.
- C. ACI certification requirements.
- D. Sealing of concrete floors.
- E. Waterproofing and coating of concrete walls.
- F. Plugging of tie holes and patching of surface defects.

1.02. REFERENCES

The publications listed below form a part of this specification.

- A. American Concrete Institute
 - 1. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials
 - 2. ACI 301 - Specifications for Structural Concrete
 - 3. ACI 303 - Guide to Cast-in-Place Architectural Concrete Practice

1.03. SAMPLES

- A. For rubbed wall finishes and walls to receive architectural finishes on this project, the first wall placement (minimum 10 feet by 10 feet) shall serve as a sample panel. This wall placement shall be rub finished as soon as practical and shall be inspected by the Engineer for approval purposes. This sample panel(s) shall be re-rubbed as required until the Engineer's approval is obtained.
- B. The approved sample panel(s) shall serve as the standard for color, texture, and quality for the remainder of the project. The Engineer shall be notified when samples (of each type finish) are completed and shall inspect same. The sample shall be approved by the Engineer in writing prior to starting the remaining areas.

1.04. SUBMITTALS

- A. Submit product data and manufacturer's installation instructions for the following:
 - 1. Floor sealant (Type E).

2. Liquid hardener with sample warranty (Type F).
 3. Cementitious waterproofing.
 4. Concrete coating systems to be submitted under Section 03732, Concrete Repair.
 5. Plug mortar for tie holes.
 6. Grout rubbing mixture for minor surface defects.
- B. Submit copy of finishing Contractor's ACI certification and/or experience record.
- C. Upon the completed installation of the liquid hardener, submit either the manufacturer's valid warranty or letter from manufacturer approving the installation and confirming the extended warranty is in effect.

1.05. QUALITY ASSURANCE

- A. Finishing foreman shall have ACI training and certification for concrete finishing and/or a minimum of five years' experience as a finishing concrete foreman.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Floor sealer (Type E) shall be BASF Chemical Company "Enviroseal 20," Euclid Chemical Company "Euco-Gard 100," Sika Corporation "Sikagard 701W," or equal.
- B. Liquid hardener (Type F) shall be a VOC compliant, deep penetrating, dustproofing, and hardening solution. Use L&M Construction Chemicals "Chem Hard," Curecrete Distribution, Inc. "Ashford Formula," Dayton Superior "Day Chem Sure Hard (J-17)," or equal. Manufacturer shall provide a minimum 10-year written warranty.
- C. Cementitious waterproofing shall be a cement-based material specifically designed for exterior, below-grade application. Use Euclid Chemical Company "Tamoseal Foundation Coating," Thoro "Thorseal Foundation Coating," or equal.
- D. Concrete coating system(s) shall be as specified in Section 03732, Concrete Repair.
- E. For limited use, to cure the grout used in a Type IV finish, liquid curing compound shall be used. Reference Section 03370, Concrete Curing and Protection, for products.
- F. Plug mortar shall be a fast-setting hydraulic cement compound that can immediately stop running water or seepage leaks in concrete. Use BASF Chemical Company "Waterplug," Euclid Chemical Company "Speed Plug," L&M Construction Chemicals, Inc. "Duraplug," or equal.
- G. Grout rubbing mixture shall consist of 1 part Portland cement and 1-1/2 parts fine sand mixed to a thin grout consistency. The sand and the Portland cement shall be obtained from the concrete batch plant where the concrete was purchased and shall be the same used in the concrete.

- H. Repair mortar for deep surface repairs (greater than 1-1/2 inches deep) in new construction is specified in Section 03300, Cast-In-Place Concrete.

PART 3 EXECUTION

3.01. CONCRETE FINISHES

The finish of all walls shall be described below and in accordance with the schedule at the end of this section. Exposed tops of walls shall be finished, as prescribed for slab and floor finishes.

A. As Cast Wall Finishes

1. Type I - Rough Form Finish - No select form facing materials shall be specified for rough form finish surfaces. Tie holes shall be filled with plug mortar. Honeycomb, voids, and other surface defects (including bugholes) greater than 3/4-inch wide and up to 1-1/2 inches deep shall be filled with grout rubbing mixture. Deeper repairs shall be accomplished using approved concrete repair mortar as specified in Section 03300, Cast-In-Place Concrete. Fins exceeding 1/4 inch in height shall be removed. Otherwise, surfaces shall be left with the texture imprinted by the forms.
2. Type II - Smooth Form Finish - The form facing material shall produce a smooth, hard, uniform texture on the concrete. It may be plywood, tempered concrete form grade hardboard, metal, plastic, paper, or other approved material.

Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.

The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the practical minimum. It shall be supported by studs or other backing capable of preventing excessive deflection (see Section 03100, Concrete Formwork, for tolerances).

Tie holes shall be plugged and all surface defects shall be patched as specified under Type I finish. All fins and irregularities shall be completely removed by grinding.

- B. Rubbed Wall Finishes - The following finishes shall be produced on concrete with a Type II smooth form finish. Where smooth rubbed finish is to be applied, the forms shall have been removed and necessary patching completed as soon after placement as possible without jeopardizing the structure and taking into account the required curing and protection. Reference Section 03370, Concrete Curing and Protection.

1. Type III - New Concrete, Smooth-Rubbed Finish - New concrete is defined here as concrete less than seven days old. Maintain curing and protection during the finishing operations.
 - a. Wet curing can be briefly interrupted for finishing as long as the concrete is not allowed to surface dry. Contractor shall be prepared to re-wet every 15 minutes or more often as needed.

- b. The finishing shall be applied no later than the day following form removal (green concrete maximum seven days old). Surfaces shall be wetted and rubbed with a carborundum brick until uniform color and texture are produced.
 - c. No cement grout shall be used other than the cement paste drawn from the concrete itself by the rubbing process. Delayed application of Type III finish will not be accepted. A Type IV finish will be required.
2. Type IV - Old Concrete, Grout-Cleaned Rubbed Finish - Old concrete is defined here as concrete over seven days old that cannot be "green rubbed."
- a. Concrete shall have completed seven days of curing per Section 03370, Concrete Curing and Protection.
 - b. Large areas more than 12 feet high or 24 feet long shall be marked off with chalk lines to produce a uniform overall pattern.
 - c. The surface shall be soaked with water. The surface being worked on shall not be in direct sunlight while finishing. Curing in direct sunlight is acceptable.
 - d. Immediately after soaking, apply the grout rubbing mixture with a rubber or cork float. The material is spread to form a thin paste over the area being worked on.

The applicator shall always work to a wet edge.

If the area starts to visually lighten up or dry, water can be added by shaking a wetted brush or using a pump sprayer to moisten the surface.

The coated area shall be permitted to set similar to waiting for a concrete floor to set.

- e. The applicator shall use a carborundum brick or specialty power tool to vigorously work the material in a circular motion to a smooth rubbed finish.
- f. It is not intended to leave a thin grout coating or a "swirl" or "fan" pattern visible on the wall.
- g. Should the mixture start to dry out or get too stiff to work, the applicator may re wet the wall with either a pump or brush.
- h. When the area is complete, it will be smooth and dark to medium grey in color. The smooth surface will be equal to a medium grade of sand paper with no "bugholes," globs, or excess material remaining.
- i. When viewed from a distance about 20 to 30 feet, the concrete will appear to be a uniform grey, creamy smooth surface.

- j. Grout-cleaned rubbed walls shall be further cured by immediately spraying the surface with liquid curing compound. The curing compound must have appropriate approvals as stated above in Part 2 or a wet cure shall be maintained as specified in Section 03370, Concrete Curing and Protection, for an additional three days.

C. Slab and Floor Finishes - The finish of all floors, slabs, flow channels, and tops of walls shall be described below and in accordance with the schedule at the end of this section. Reference Table 03350-1 at the end of this section for floor finishing tolerances.

- 1. Type A, Scratched Finish - After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall be floated with a magnesium float.

If any water has been brought to the surface by the float during rough finishing, floating operations shall not continue until this water is allowed to evaporate.

Floating shall proceed when the water sheen has disappeared and the surface has stiffened sufficiently. During floating, planeness of surface shall be checked with a 10-foot straightedge applied at not less than two different angles.

After floating to a Class C tolerance, the surface shall be roughened to a 1/4-inch amplitude with a coarse steel rake before final set.

- 2. Type B, Floated Finish - The procedure for a floated finish is the same as for Type A up to roughening the surface.

The slab is floated, with all high spots cut down and all low spots filled to produce a surface with a Class B tolerance. The slab shall be finish floated to a uniform sandy texture.

Tops of walls shall be finished with a Type B finish, except initial floating shall be followed immediately with a light trowel, being careful not to trowel in bleed water. If bleed water is present, Contractor shall wait for its evaporation before applying trowel finish.

- 3. Type C, Troweled Finish - The surface shall first receive a Type B floated finish. It shall next be power troweled, and finally hand troweled for thorough consolidation. The first troweling after power troweling shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently.

The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface.

The finished surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be plane to a Class A tolerance, except tolerance for tank base slabs shall be to a Class B tolerance.

Apply only a light trowel finish, free of trowel marks, for concrete tank base slabs.

4. Type D, Broom Finish - First, finish the concrete with a Type B floated finish. The concrete shall be given a transverse scored texture by drawing a coarse broom across the surface, perpendicular to the line of travel along the walking surface.
5. Type E, Concrete Floor Sealer - Exposed-to-view floor slabs and other surfaces as scheduled shall be sealed as follows:
 - a. Prior to applying floor sealant, thoroughly clean the concrete surface.
 - 1) At new concrete floors, remove all dirt, oil, grease, and other foreign matter with caustics and detergents.
 - 2) At existing concrete floors, the concrete shall first be cleaned using an abrasive brush-off blast, followed by caustics and detergents as needed.
 - b. Thoroughly rinse and apply two coats of sealer in accordance with manufacturer's recommendations.
 - 1) At new concrete floors, the first coating shall be applied as soon as possible after finishing and curing. The second coating shall be applied near project completion after installation of all equipment and piping and after completion of other related construction activities.
 - 2) At existing concrete floors, apply the first coating as soon as possible after the floor is cleaned. Apply the second coating near project completion after installation of all equipment and piping and after completion of other related construction activities.
6. Type F, Liquid Hardener Finish - This finish shall be applied to floor surfaces as scheduled. Floors to receive this finish shall have previously received a Type C finish. Liquid hardener shall be applied after curing at approximately 10 days after concrete placement or as recommended by the manufacturer.

Prior to applying liquid hardener, thoroughly clean the concrete surface as follows:

- a. At new concrete floors, remove all dirt, oil, grease, and other foreign matter with caustics and detergents.
- b. At existing concrete floors, the concrete shall first be cleaned using an abrasive brush-off blast, followed by caustics and detergents as needed.

Application procedure shall be in accordance with manufacturer's instructions. Consult with the manufacturer in order to obtain the extended warranty.

7. Type G, Concrete Topping
 - a. This finish shall be applied to certain floor or tank slabs (as scheduled) that may or may not have first received a Type A scratched finish. Reference Section 03300, Cast-In-Place Concrete, for Mix C and CF concrete toppings.

- b. Prior to placement of topping, the floor or tank slab shall be prepared, cleaned, and dampened but left free of standing water.
- c. Immediately before the topping is placed, a bonding agent shall be applied on the overlayed surface (reference Section 03250, Concrete Joints and Accessories).
- d. The concrete topping shall be placed against screeds in conformance with the pitches shown. The resulting finish shall be the equivalent to a Type C troweled finish.
- e. When applicable, the topping shall be "swept" in by the permanent mechanical equipment.

D. Finishes for Bottom and Side Formed Surfaces Exposed to View

- 1. General - This includes the side and underside finishes of slabs, beams, columns, and other miscellaneous surfaces left exposed after form removal.
- 2. Finishes - These surfaces shall be finished to the same quality as scheduled for the wall surfaces in a given area. In the event there is no scheduled finish, all surfaces exposed to view shall receive the equivalent of a Type II finish.

E. Finish Schedules

- 1. Floor (Horizontal) Finishes - See Table 03350-1 for tolerances and Table 03350-3 for finish types.
- 2. Wall (Vertical) Finishes - See Table 03350-2.

3.02. CEMENTITIOUS WATERPROOFING

- A. Comply with manufacturer's printed recommendations for preparation of wall surface.
- B. Clean surfaces of soil, debris and all foreign matter. Allow cleaned surfaces to dry.
- C. Apply two uniform coats per manufacturer's recommendations.
- D. Waterproof vertical wall surfaces to within 4 inches of finished grade at top of walls. At bottom of walls, extend across horizontal projection of base slab and down face of slab approximately 2 inches.

3.03. CONCRETE COATING SYSTEM

- A. Apply concrete coating system as specified in Section 03732, Concrete Repair, and where indicated on the Contract Drawings.

3.04. TIE HOLES AND SURFACE DEFECTS

- A. General - Repair Contractor-cast concrete, including tie holes and surface defects (honeycomb, large bugholes, pits, etc.) with surface areas greater than 3/4 square inch or 1/4-inch depth.

- B. Tie holes shall be filled with specified plug mortar.
- C. Surface defects less than 1-1/2 inches deep shall be removed down to sound concrete. If chipping is necessary, the edges shall be perpendicular to the surface or slightly undercut. No feathered edges will be permitted.
1. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the grout rubbing mixture.
 2. The quantity of mixing water shall be no more than necessary for handling and placing.
 3. After surface water has evaporated, the grout rubbing mixture shall be applied.
 4. The grout shall be consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for approximately one hour before being finally finished.
 5. The patched area shall be cured using a liquid curing compound. Metal tools shall not be used in finishing a patched area which will be exposed. Exposed surfaces shall be left uniform in appearance. Patching shall be completed prior to application of other specified surface finishes.
- D. Surface defects greater than 1-1/2 inches deep shall be repaired using an approved concrete repair mortar as specified in Section 03300, Cast-In-Place Concrete.

TABLE 03350-1 FLOOR FINISHING TOLERANCES

Class A	Troweled finishes and troweled toppings shall be true planes within 1/8-inch in 10 feet, as determined by a 10-foot straightedge placed anywhere on the slab in any direction.
Class B	Floated finishes shall be true planes within 1/4-inch in 10 feet, as determined by a 10-foot straightedge placed anywhere on the slab in any direction.
Class C	Scratch finishes and concrete fills shall be true planes within 1/4-inch in 2 feet, as determined by a 2-foot straightedge placed anywhere on the slab in any direction.

(continued on next page)

TABLE 03350-2 WALL (VERTICAL) FINISHES

Type I	Rough Form Finish - All concrete not exposed to view or not in contact with liquid. Below-grade walls not receiving dampproofing, waterproofing, or insulation.
Type II	Smooth Form Finish - The interior of all liquid containment structures (tanks, flow channels, etc.) and all concrete to be dampproofed or waterproofed, receive a coating system, and/or receive insulation.
Type III ⁽¹⁾ (Exterior)	Smooth Rubbed Finish - Exterior exposed-to-view concrete wall areas and edges of slabs. This finish shall be carried to a minimum of 6 inches below finished grade.
Type III ⁽¹⁾ (Interior)	Smooth Rubbed Finish - Interior exposed-to-view concrete wall areas, columns, curbs, equipment supports and pads, housekeeping pads, and all other surfaces not indicated to receive other finish.
Waterproofing	Apply cementitious waterproofing where shown on Contract Drawings and on exterior surfaces of walls at intentionally dry areas that are backfilled.
Concrete Coating Systems	Apply concrete coating system as specified in Section 03732, Concrete Repair, where shown on the Contract Drawings, and on liquid side opposite of intentionally dry areas.

⁽¹⁾ Unacceptable Type III finish areas shall be refinished with a Type IV grout-cleaned rubbed finish.

TABLE 03350-3 FLOOR (HORIZONTAL) FINISHES

Type A	Scratched Finish - For surfaces intended to receive bonded applied cementitious applications of Type G, Concrete Topping.
Type B	Floated Finish - At tops of walls and footings, for surfaces intended to receive roofing, and surfaces to receive and a Type D broom finish.
Type C	Troweled Finish - For all horizontal surfaces (including slabs and concrete toppings) not indicated to receive other finish. Apply a light troweled finish for tank (and channel) base slabs.
Type D	Broom Finish - For exterior walkways, exterior platforms, sidewalks, and other exterior walking surfaces.
Type E	Concrete Floor Sealer - For interior and exterior exposed-to-view slabs (not receiving a floor covering), electrical/pump/equipment room floors, sidewalks, etc., and where indicated in the Room Finish Schedule.
Type F	Liquid Hardener Finish
Type G	Concrete Topping – Where shown on Contract Drawings.
Concrete Coating System	Apply concrete coating system on tank (and channel) base slabs as specified in Section 03732, Concrete Repair, and indicated on Contract Drawings.

END OF SECTION

SECTION 03370

CONCRETE CURING AND PROTECTION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Curing and protection for all concrete slabs, other flatwork (including toppings, beams, etc.), and for all walls and other vertical members (including columns, grade beams, etc.) during:
 - 1. Normal weather conditions.
 - 2. Hot weather conditions.
 - 3. Cold weather conditions.
- B. Limited use of curing compound.

1.02. REFERENCES

The publications listed below form a part of this specification.

- A. American Concrete Institute
 - 1. ACI 305R - Hot Weather Concreting
 - 2. ACI 306R - Cold Weather Concreting
 - 3. ACI 308R - Guide to Curing Concrete
- B. American Society for Testing Materials
 - 1. ASTM C171 - Sheet Materials for Curing Concrete
 - 2. ASTM C309 - Liquid Membrane Forming Compounds for Curing Concrete.

1.03. SUBMITTALS

- A. Prior to placement of any concrete, submit an outline indicating various curing and protection methods and procedures intended for use on this project during each of the following conditions:
 - 1. Normal weather conditions.
 - 2. Hot weather conditions.

3. Cold weather conditions.

Include procedures for slabs (and other flatwork), walls (and other vertical members), and footings.

- B. Submit single-page catalog cut for curing compound with fugitive dye specifically indicated.
- C. Submit single-page catalog cut for polyethylene film with material selection specifically indicated.

1.04. COORDINATION

- A. Contractor's outlined curing and protection methods and procedures shall be approved prior to first concrete placement.
- B. Coordinate curing, protection, and rubbed wall finish to occur simultaneously during the initial seven-day period after concrete placement. Reference Section 03350, Concrete Finishes.
- C. Coordinate sequence of work to avoid loading or working on newly cast concrete for the first 24 hours.
- D. The Owner's representative and/or Engineer shall make final determination of when hot weather or cold weather curing and protection requirements are in effect.

PART 2 PRODUCTS

2.01. CURING WATER

- A. Water shall be potable.
- B. Water shall be free of materials that have the potential to stain concrete.

2.02. CURING COMPOUNDS

- A. Curing compound shall be a dissipating, VOC-compliant, water-based, liquid membrane-forming, including a fugitive dye, and conforming to ASTM C309, Type 1-D.

Use Conspec by Dayton Superior "Rx Cure WB," The Euclid Chemical Company "Tammsecure WB 30D," W.R. Meadows, Inc. "1100-Clear," or equal.
- B. Curing compound shall be applied at twice the manufacturer's recommended application rate.

2.03. POLYETHYLENE FILM

- A. Polyethylene film shall be white (opaque) and shall meet the requirements of ASTM C171.

- B. Polyethylene film used on this project shall be maintained in like new condition or shall be replaced. The Owner's representative shall have the final decision when condition of film becomes unacceptable.

2.04. ADMIXTURES

- A. Accelerating admixtures associated with cold weather concrete are not allowed in Mix B concrete used for liquid containment structures. Refer to Section 03300, Cast-in-Place Concrete, for other concrete mixes that are allowed to consist of acceleration admixtures.

PART 3 EXECUTION

3.01. PREPARATION

- A. All freshly placed concrete shall be protected from adverse weather and from defacement. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provisions shall be made for providing continuous curing and protection as required below.

3.02. NORMAL WEATHER CURING AND PROTECTION

- A. Definition of Normal Conditions - All conditions not defined as either hot or cold weather.
- B. Slabs and Other Flatwork
 - 1. After finishing and immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, provide continuous moist curing for at least the first 24 hours.
 - 2. After the initial 24-hour period, cure for an additional 6 days with one of the following methods:
 - a. Cover with white polyethylene film.
 - b. Cover with burlap and continuous sprinkling with water.
 - c. Continuous water spray with no covering.
- C. Walls and Other Vertical Members
 - 1. Immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, provide continuous moisture at the exposed top surface for at least the first 24 hours.
 - 2. After the initial 24-hour period, cure for an additional six days with one of the following methods. (Note: For walls specified to receive a rubbed finish, forms must be removed and rubbed finish applied prior to the end of the seven-day curing period.)
 - a. Leave forms in place, tight. Provide continuous moisture at the exposed top surface.

- b. Leave forms in place; loosen after 24 hours. Provide continuous water at top of wall (or member) to soak all sides.
 - c. Remove forms; soak walls with water. Cover tightly with white polyethylene film.
 - d. Remove forms; cover with burlap and soak by continuous spray.
- D. Strip Footings and Isolated Column Footings (Note: Strip footings include footings of foundation (frost) walls, retaining walls, and flood walls.)
 - 1. After finishing, apply curing compound at twice the manufacturer's recommended application rate.
 - 2. Curing compound shall be applied to and seamlessly cover all exposed surfaces.
- E. For the first 24 hours after concrete finishing, no work shall commence nor shall any material be placed on concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining six days of the curing period.
- F. Interruptions, not to exceed a total of four hours are permitted for the purpose of layout, shoring or reshoring, finishing, or other required construction needs as long as the surface is not allowed to completely dry. Be prepared to spray the exposed surface every 15 to 30 minutes.

3.03. HOT WEATHER CURING AND PROTECTION

- A. Conform to ACI 305R when concreting during hot weather except as modified below.
- B. Definition of Hot Weather - When combinations of high air temperature, low relative humidity, and wind speed have the potential to cause the concrete to reach the critical evaporation rate (0.15 lbs/ft²/h), the Contractor and his concrete supplier shall exercise precautionary measures in preparing, delivering, placing, finishing and curing of the concrete.

The Owner's representative and/or Engineer shall determine if hot weather conditions are in effect in accordance with ACI 305R. Note that it is possible to have hot weather conditions with air temperatures as low as 65 degrees F if low humidity and moderate wind speeds (10 mph or greater) exist. By default, when air temperatures exceed 80 degrees F, regardless of relative humidity levels and wind speed, hot weather conditions shall be in effect.

- C. Temperature of fresh concrete shall not exceed 90 degrees F. Concrete delivered at temperatures exceeding 90 degrees F shall be rejected.
- D. Curing of the concrete shall begin immediately after completion of the initial finishing operation.
 - 1. Slabs and Other Flatwork - After the initial 24-hour period of moist curing, continue wet cure for an additional six days with one of the following:

- a. Soak with water and cover with white polyethylene film.
 - b. Cover with burlap and continuous sprinkling with water.
 2. Walls and Other Vertical Members - After the initial 24-hour moist curing, continue wet cure for an additional six days with one of the following. (Note: See normal weather curing above for coordination of rubbed wall finish.)
 - a. Leave forms in place, tight with soaker hose on top.
 - b. Leave forms in place; loosen after 24 hours. Provide continuous water or double soaker hoses on top.
 - c. Remove forms; soak walls with water. Cover tightly with white polyethylene film over soaker hose at top of wall.
 3. Strip Footings and Isolated Column Footings (Note: Strip footings include footings of foundation (frost) walls, retaining walls, and flood walls.)
 - a. After finishing, apply curing compound at twice the manufacturer's recommended application rate.
 - b. Curing compound shall be applied to and seamlessly cover all exposed surfaces.
 - c. After applying curing compound, completely cover the concrete with white polyethylene film.
 - E. Monitor concrete temperature for walls and slabs 20 inches thick or more. After temperature has peaked, control rate of cooling to ambient temperature at a rate of 1 degree F per hour to prevent cracking.
 - F. For the first 24 hours after concrete finishing, no work shall commence nor shall any material be placed on concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining six days of the current period.
 - G. Interruptions, not to exceed a total of four hours are permitted for the purpose of layout, finishing, or other required construction needs as long as the surface is not allowed to completely dry. Be prepared to spray the exposed surface every 15 to 30 minutes.
- 3.04. COLD WEATHER CURING AND PROTECTION
- A. Conform to ACI 306R when concreting during cold weather except as modified below.
 - B. Definition of Cold Weather - A period when for more than three consecutive days the average daily temperature drops below 40 degrees F. When temperatures above 50 degrees F occur during more than half of any 24-hour period, the concrete shall no longer be regarded as cold weather concrete. The Owner's representative shall monitor daily temperatures for determination of start and stop of cold weather concreting. Contractor shall comply with this determination.

- C. The methods of curing and protecting the concrete shall be such as will prevent drying or freezing. Labor, equipment, and materials necessary for cold weather curing and protection (including heating) shall be on the site and set up (staged) in sufficient quantity before concrete placement begins.
- D. Concrete must be cured and protected from cold weather simultaneously.
- E. For the first 24 hours after concrete finishing, no work shall commence nor shall any material be placed on concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining duration of the curing and protection period.
- F. Curing
 - 1. Slabs and other flatwork shall be cured with one of the following:
 - a. Coat with curing compound applied at twice the recommended manufacturer's application rate.
 - b. Cover with polyethylene film.
 - 2. Walls and other vertical members shall have forms left in place, tight for the first 24 hours. Apply twice the application rate of curing compound to the exposed top surface or cover with polyethylene film. After the initial 24-hour period, cure for an additional six days with one of the following:
 - a. Leave forms in place, tight as above.
 - b. If forms are loosened, immediately remove forms and either: (1) apply curing compound at twice the manufacturer's recommended application rate to all surfaces; or (2) cover tightly with polyethylene film.

(Note: Coordinate with rubbed wall finish requirements.)
- G. Protection
 - 1. Protection shall proceed as follows:
 - a. For Slabs and Other Flatwork
 - 1) Cover with blankets and/or heated enclosure as required.
 - b. For Walls and Other Vertical Members (Note: Extra effort will be required to prevent freezing when using water to complete rubbed wall finishing.)
 - 1) Forms Left in Place, Not Loosened - Cover with blankets and/or heated enclosure as required.
 - 2) Forms Removed Prior To End Of Protection Period - Re-cover with blankets and/or heated enclosure as required.

2. The length of the protection period for each type of member shall be as determined in the table below.

COLD WEATHER PROTECTION PERIOD

Type of Member	Service Category	Temperature Range	Type I or II Cement (days)	Type III Cement (days) ⁽¹⁾
Slab-On Grade	3	50°F – 70°F	6	4
Columns	3	50°F – 70°F	6	4
Walls ⁽²⁾	3	50°F – 70°F	6	4
Walls ⁽³⁾	4 ⁽⁴⁾	50°F – 70°F	21 ⁽⁵⁾	14 ⁽⁵⁾
Beams	4 ⁽⁴⁾	50°F – 70°F	21 ⁽⁵⁾	14 ⁽⁵⁾
Slabs (other) ⁽⁶⁾	4 ⁽⁴⁾	50°F – 70°F	21 ⁽⁵⁾	14 ⁽⁵⁾

- (1) Obtain written approval by the Engineer for the use of Type III cement or an acceleration admixture.
- (2) Walls that will not be service loaded (leak tested or backfilled) for at least 60 days after placement.
- (3) Walls that are to be service loaded soon after concrete placement.
- (4) Formwork shall remain in place until the end of the protection period for Service Category 4 structural members.
- (5) Protection period could be shortened based on concrete achieving at least 80 percent of the required design strength as determined by testing of field-cured cylinders.
- (6) All structural slabs supported by temporary formwork.

- H. Suitable means shall be provided for maintaining the deposited concrete within the temperature range as defined above. Curing provisions as stated above must be in place prior to exposing concrete to heat.

Heating may be provided by using a vented heating unit, insulated blankets, or a combination of both.

1. If blankets are to be used, they should be applied to the concrete as specified in ACI 306R, Chapter 7, Charts 7.3.1-7.3.4. Special attention should be given to corners and edges of concrete members which could require about three times the thickness of insulation to maintain concrete temperature, as compared to thickness that might be required for interior spaces. Also note that excessive amounts of blankets could raise the temperature of the concrete too high which could cause an increase of thermal shrinkage and cause cracking due to thermal shock.
2. Where heated enclosures are provided, vent flue gases from combustion heating units to the outside of the enclosure. Place and direct heaters to avoid areas of overheating or drying of the concrete surface. Exposed concrete surfaces must be protected and cured. Where continuous moist curing is not practical, tightly adhered polyethylene or curing compounds shall be used.

I. Monitoring of Concrete Temperatures

1. In order to adjust and maintain cold weather procedures, various thermometers (supplied and maintained by the Contractor) shall be placed along concrete members that are undergoing cold weather protection, particularly at corners and edges of concrete members where it is more difficult to maintain the required temperature.
2. Monitoring of these temperatures must be done throughout the day, taking into account forecasted night conditions. Make timely adjustments to maintain an even temperature.

At a minimum, temperatures shall be recorded at start of work in the morning, at noon, and at end of work day (but early enough to have time to make necessary adjustments to cold weather protection).

3. Access to these thermometers must be made available for the Owner's representative to perform spot-checking of the Contractor's effectiveness to achieve proper cold weather protection.
4. Provide the proper type and sufficient quantity of thermometers to determine the temperature of the concrete. As a minimum, provide, locate, and maintain at least one Hi-Low thermometer and at least two surface thermometers for each placement of concrete which is simultaneously undergoing cold weather curing and protection.

J. Interruptions to Protection

1. Measures shall be taken to assure the concrete temperatures will not drop below 32 degrees F.
2. Interrupted time must be made up in accordance with ACI 306R, Section 7.7. Time lost from required period of protection shall be made up with twice the number of lost degree hours.

- K. After the required protection period listed in the above table, concrete shall have curing coverings removed and be allowed to gradually dry out prior to lowering temperatures to freezing as described in the following table.

MAXIMUM CONCRETE TEMPERATURE DROPS AT END
OF PROTECTION PERIOD

Thickness of Section, Inches	Maximum Gradual Decrease in Surface Temperature During Any 24 Hours After End of Protection, °F
Less than 12	50
12 to less than 36	40
36 to 72	30
Greater than 72	20

3.05. FINAL CONCLUSION OF CORING PROTECTION PERIODS

- A. At the conclusion of curing and protection periods, all concrete surfaces shall be washed down to remove all debris and laitance material.
- B. Complete removal of curing compounds will be required prior to application of coatings or other toppings. A light abrasive blast or other mechanical means may be required.

END OF SECTION

SECTION 03415

PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Shop cast prestressed, precast concrete hollow core slabs (planks).
- B. Concrete and grout mixes.
- C. Saw cut openings and trim.

1.02. APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification:

- A. American Concrete Institute (ACI) Publications
 - 1. ACI 301 - Specifications for Structural Concrete
 - 2. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
 - 3. ACI 308 - Guide to Curing Concrete
 - 4. ACI 309 - Practice for Consolidation of Concrete
 - 5. ACI 318 - Building Code Requirements for Reinforced Concrete
- B. American Society for Testing and Materials (ASTM) Publications
 - 1. A82 - Steel Wire, Plain, for Concrete Reinforcement
 - 2. A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 3. A416 - Uncoated Seven Wire Stress Relieved Steel Strand for Prestressed Concrete
 - 4. A421 - Uncoated Stress Relieved Steel Wire for Prestressed Concrete
 - 5. A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement
 - 6. A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement
 - 7. C33 - Concrete Aggregates
 - 8. C94 - Ready Mixed Concrete
 - 9. C150 - Portland Cement

10. C260 - Air Entraining Admixtures for Concrete
11. C494 - Chemical Admixtures for Concrete
12. C595 - Blended Hydraulic Cements
- C. Precast/Prestressed Concrete Institute (PCI) Publication
 1. MNL 116 - Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products
 2. MNL-120 - Design Handbook - Precast and Prestressed Concrete

1.03. DESCRIPTION OF WORK

- A. The work includes the design, supply, and installation of prestressed, precast hollow core concrete planks, herein referred to as precast planks. The Contractor shall furnish all materials including grout and headers, labor, equipment, tools, etc., required for the design, fabrication, transportation, and erection.
- B. Contractor shall be responsible to coordinate and provide all opening sizes and locations, and to obtain and provide weights of all approved equipment and accessories to precast plank supplier.
- C. Contractor shall be responsible to coordinate the complete installation and to provide labor and equipment to saw cut and/or core drill all required openings, weld all connections, grout in all shear keys, and install connections as indicated or required by the design.

1.04. DESIGN REQUIREMENTS

- A. Contractor-Furnished Design - Design of precast concrete hollow core planks for the design load conditions and spans indicated on the Contract Drawings and for additional loads imposed by openings and supports of the work of other trades (and other contracts).
- B. Concrete toppings shall not be used in establishing the design strength of the precast planks.
- C. Calculations and shop drawings shall be prepared, sealed, and signed by a professional engineer registered in the State of New York.
- D. Loads shall be as shown on the Contract Drawings and for support of all equipment and accessories (with information provided by Contractor).

1.05. SUBMITTALS

- A. Submit documentation to show current PCI certification.
- B. The (General) Contractor shall transmit precast plank shop drawings to all other contractors and/or subcontractors of all the trades to obtain locations and sizes of all required openings, and to acquire loads (weights) of all approved equipment and accessories. This coordination shall be done prior to design of precast plank(s) and submission of shop drawings.

- C. Shop Drawings - Provide stamped and sealed shop drawings for approval prior to fabrication, after the Contractor has completed their coordination of all equipment and accessory loads, and required opening locations and sizes. Include complete information for the fabrication, handling and erection of all precast planks. Shop drawings shall not be reproductions of Contract Drawings. The shop drawings shall indicate, as a minimum, the following information:
1. Layout of precast planks.
 2. Location and size of all openings verified by the Contractor.
 3. Details of joints and connections between planks.
 4. Connection details of planks to other construction (supporting structure) such as walls, beams, etc.
 5. Header sizes for openings, if required.
 6. Dimensions and surface finishes of each plank type.
 7. Estimated camber.
 8. Prestressing strand details and locations.
 9. Material properties of prestressing strands, concrete, and grout.
 10. All loads used in design such as live, dead, mechanical equipment and accessories (verified by Contractor), handling, and erection.
 11. Notation that indicates compliance with references and publications as listed in Article 1.03 above.
- D. As a separate submittal, provide two file copies of calculations for each type and length of precast plank with a stamped and sealed "Design Summary" cover sheet listing all the design criteria and loads used in the design(s). Only the Design Summary cover sheet will be reviewed, not the prepared calculations. Calculations will not be returned to the Contractor.
- E. Prestressing Strands - Certified mill test reports shall be submitted to the Engineer for record.
- F. Concrete Mix Design - Maintain on file, for submittal to Engineer only if requested, the concrete mix design for each strength and type of concrete. List materials including type and amount of cement and admixtures; and applicable reference specifications. Keep copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified.

- G. Near completion of project when all equipment and accessories have been installed on/from the precast planks and all saw cuts and holes have been made, the Contractor shall accurately map these items on the precast shop drawing plan and submit to precast manufacturer to confirm adequacy of precast plank designs. Actual loads (weights) of installed equipment and accessories shall be provided by Contractor. Any resulting deficiencies of installed precast planks shall be strengthened or replaced at Contractor's expense. Submit written confirmation of final acceptance from precast plank supplier for file.

1.06. QUALITY ASSURANCE

- A. Manufacturer shall be a PCI-certified plant for production of precast planks as specified herein.
- B. All fabricated precast planks shall meet the tolerances as specified in PCI MNL-116 and per MNL-120. In addition, the measured cambers for all precast planks shall not vary by more than 1/2 inch (\pm).
- C. A minimum of four 6-inch diameter test cylinders shall be taken during each day's casting operation.

Compressive strength tests shall be run on each day's cylinders as follows: 2 shall be broken prior to prestress force release and 2 at the end of 28 days.

Cylinders shall be prepared and tested in accordance with ACI 301.

The manufacturer may test the concrete cylinders with their own qualified staff and equipment. When requested, the manufacturer must demonstrate to the Engineer's satisfaction that only competent, trained personnel will be engaged in such work and that all testing equipment has been recently inspected and calibrated within the last year, and is in first class operating condition, otherwise an independent testing laboratory shall be used.

- D. Contractor shall coordinate Special Inspections as required for precast plant inspections and for field installations. Reference Section 01420, Special Inspections

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Store precast concrete off the ground. Separate stacked members by battens across the full width of each bearing point.

PART 2 PRODUCTS

2.01. CONCRETE

- A. The minimum compressive strength of concrete at 28 days shall be 5,000 psi.

2.02. MATERIALS

- A. Cement - ASTM C150, Type I or III.
- B. Water - Water shall be potable.

- C. Aggregates - ASTM C33.
 - D. Grout - Use cement/sand mixture per plank manufacturer's recommendations.
 - E. All exposed metal accessories shall be hot-dip galvanized or Type 316 stainless steel.
 - F. Admixtures
 - 1. Air Entraining - ASTM C260.
 - 2. Accelerating - ASTM C494, Type C or E.
 - 3. Water Reducing - ASTM C494, Types A, E or F.
 - G. Reinforcement
 - 1. Prestressing Strands
 - a. Seven-Wire Stressed Relieved - ASTM A416 or ASTM A416 with supplement for low relaxation wire.
 - b. Single-Wire Stressed Relieved - ASTM A421 or ASTM A421 with supplement for low relaxation wire.
 - 2. Reinforcing Steel - ASTM A615, Grade 60 deformed bars.
 - H. Bearing Pads - As required by plank manufacturer.
- 2.03. FABRICATION (PCI MNL 116 UNLESS SPECIFIED OTHERWISE)
- A. Forming operations shall produce a smooth dense surface.
 - B. Reinforcement Placement - ACI 318 for placement and splicing. Provide connecting bars or other approved connection methods between precast and masonry or cast-in-place construction.
 - C. Concrete Cover - Provide minimum 1-1/4-inch strand cover for severe exposure.
 - D. Concrete
 - 1. Concrete Mixing - ASTM C94. Mixing operations shall produce batch to batch uniformity of strength, consistency and appearance.
 - 2. Concrete Placing - ACI 304 and ACI 309, unless otherwise specified.
 - 3. Concrete Curing - Commence curing immediately following the initial set and completion of surface finishing. Provide curing procedures to keep the temperature of the concrete between 50 and 190 degrees F. When accelerated curing is used, apply heat at controlled rate and uniformly along the casting beds. Monitor temperatures at various points in a product line in different casts.

- E. Prestressing - Do not transfer prestressing forces until the concrete has reached a minimum compressive strength of 3,000 psi unless a higher strength is required by the Contractor furnished design.
- F. Surface Finish and Condition
 - 1. Unexposed Surfaces to Receive Roofing - Provide a commercial grade floated finish.
 - 2. Exposed Surfaces - Provide a standard grade surface finish acceptable to be painted. Fill all imperfections greater than 1/8 inch deep or 1/16 inches wide and grind smooth.
 - 3. Precast planks which consist of honeycombs or other surface defects deep enough to expose prestressing strands shall be rejected.
 - 4. Precast planks containing hairline cracks which are visible but less than 0.02 inches in width and/or excessive in quantity require approval by Engineer prior to installation.
 - 5. Precast planks that are damaged or have cracks greater than 0.02 inches in width shall be rejected.
 - 6. Precast planks that do not meet the fabrication tolerances specified in Article 1.07 shall be rejected.
 - 7. All rejected planks, solely determined by the Engineer, shall be removed from the site and replaced at no cost to the Owner.

PART 3 EXECUTION

3.01. SURFACE REPAIR

- A. Prior to erection and again after installation, Contractor shall check precast concrete for damage such as cracking, spalling, and honeycombs. Precast concrete that does not meet the surface finish requirements specified in Part 2 shall be repaired or removed and replaced at the Contractor's expense.

3.02. BEARING SURFACES

- A. Shall be flat and free of irregularities. Before erection, the Contractor shall verify that bearing surfaces are sized to provide the required clearances. Correct bearing surface irregularities with non-shrink grout and/or grinding as required. Provide bearing pads only as required by plank manufacturer's design.

3.03. ERECTION

- A. Precast planks shall be erected after the concrete has attained the specified compressive strength, but shall not be fixed in position until the unit has "aged" 90 days after detensioning.

- B. Erect in accordance with the approved shop drawings. Reference PCI MNL-116 and MNL-120 for tolerances.
- C. Follow the plank manufacturer's recommendations for maximum construction loads. Place precast planks level, plumb, square and at right angles to the bearing surface, unless indicated otherwise, and draw up tight without forcing or distortion. Align plank ends.
- D. Connections - All plank end and sidelap connections to supporting structure(s) shall be installed in accordance with the details on the Contract Drawings or as approved on the shop drawings.
- E. Grouting - All keyways between adjacent units shall be fully grouted. Take care to solidly pack entire depth of keyway flush to top of precast. Prevent leakage or droppings of grout through the assembled deck. Any grout which seeps through the deck shall be removed before it hardens. Grouting shall not start until all units are in place.
- F. Differential camber occurring between adjacent units at roof deck levels in excess of 1/4 inch shall be dressed with non-shrink grout, or other approved material.
- G. Welding - Connections which require welding shall be accomplished only by experienced and qualified personnel.

3.04. CONSTRUCTION LOADS

- A. Loads shall not be placed on these precast planks until all keyways have been fully grouted and/or as instructed by the plank manufacturer.
- B. In no case shall concentrated loads or construction loads exceeding the design loads be placed on these precast planks.

3.05. FIELD-INSTALLED OPENINGS

- A. The Contractor shall locate and receive prior approval from plank manufacturer for all openings to be field installed.
- B. All circular openings 16 inches in diameter or smaller shall be core drilled.
- C. All rectangular openings shall be saw cut without overcutting. Use of a specialty type concrete saw is required. All cuts shall be clean and not broken out.
- D. The Contractor shall finish off and/or trim any cores left exposed and visible after construction. This includes plank ends or exposed cores after saw cutting for openings. If not otherwise indicated on the Contract Drawings, all cores shall be sealed with backpainted aluminum trim.
- E. Any oversized cut openings which result in a gap around equipment or mechanical fittings shall be trimmed off by the Contractor to neatly hide gaps using backpainted aluminum trim.

3.06. PROTECTION OF WORK

- A. All precast planks are to be protected from physical damage, and from water infiltration and freezing immediately following installation.
- B. Any and all remedial efforts to correct noted deficiencies for installed precast planks shall be determined by the plank manufacturer and are the responsibility of the Contractor.

END OF SECTION

SECTION 03451

ARCHITECTURAL PRECAST CONCRETE

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Architectural precast concrete sills
- B. Supports, anchors, and attachments.
- C. Sealing of joints.
- D. Grout under precast units.

1.02. REFERENCES

The publications listed below form a part of these specifications.

ACI 301	Specifications for Structural Concrete for Buildings
ACI 318	Building Code Requirements for Reinforced Concrete
ASTM A386	Zinc Coating (Hot-Dip) on Steel Products
ASTM C143	Test for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM A325	High Strength Bolts
ASTM A615	Deformed and Plain Billet Steel Bars for Concrete Reinforcement
ASTM C33	Concrete Aggregates
ASTM F593	Stainless Steel Bolts
PCI MNL-117	Manual for Quality Control for Plants and Production of Architectural Precast Concrete
PCI MNL-120	Design Handbook - Precast and Prestressed Concrete

1.03. DESIGN REQUIREMENTS

- A. Design units to withstand all dead loads, wind loads, and erection forces.
- B. Units shall accommodate construction tolerances, deflection of building structural members and clearances of intended openings.
- C. Detail component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

1.04. SUBMITTALS

- A. Submit evidence that shows current Precast Concrete Institute (PCI) or Architectural Precast Association (APA) certification.
- B. Shop Drawings - Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, location of lifting devices, dimensions, openings, relationship to adjacent materials, and concrete mix design, including color and texture options for Architect selection. Provide erection drawings.
- C. Samples - The Contractor shall submit two 12-inch by 12-inch samples for each type of surface after color and texture are selected. Additional samples will be required until approved by the Engineer. Samples of each type of insert proposed for the project shall be submitted for approval.
- D. The approved sample(s) shall serve as the standard for quality, color, and texture. The Engineer shall be notified when the first unit is completed and shall inspect same. The initial units shall be approved by the Engineer prior to starting the remaining production units.
- E. Submit catalog cut for grout.

1.05. QUALITY ASSURANCE

- A. Manufacturer shall be a PCI- or APA-certified plant for production of precast concrete as specified herein.
- B. Perform Work in accordance with the PCI MNL-117, PCI MNL-120, PCI Manual For Structural Design of Architectural Precast Concrete, and ACI 318.
- C. The facilities shall be suitably enclosed to provide quality control and a consistently controlled environment during production, and the facilities shall also have sufficient capacity and equipment capable of producing the work all within the allotted time.

1.06. FIELD SAMPLES

- A. Provide field sample of one sill piece. Size to be coordinated with masonry sample panel under Section 04300, Unit Masonry System.

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site using special care to protect units and prevent staining, chipping, or spalling of concrete. All units shall be stored off the ground.
- B. Lifting or handling equipment shall be capable of maintaining "as new" condition of the units during manufacture, storage, transportation, erection, installation, and in position for fastening.
- C. Mark units with date of production in location not visible to view when in final position in structure.

- D. All damaged units shall be repaired or replaced to the satisfaction of the Engineer.

1.08. FIELD MEASUREMENTS

- A. Verify field conditions and measurements prior to fabrication.

PART 2 PRODUCTS

2.01. CONCRETE MATERIALS

- A. Cement - ASTM C150, Portland Type I or III.
- B. Aggregates shall be natural sand for fine aggregate and crushed stone for coarse aggregate, complying with the requirements of ASTM C33.
- C. Reinforcing Steel - ASTM A615, Grade 60, deformed steel bars. ASTM A185 for welded steel wire reinforcement. Strength and size commensurate with precast unit design.
- D. Air Entrainment Admixture - ASTM C260.
- E. Admixtures containing calcium chloride shall not be used.
- F. The source of all cement and aggregates shall remain the same for all elements to ensure maximum uniformity of color and texture.
- G. Surface Finish Aggregate - Clean, smooth natural limestone color.
- H. Grout - Non-shrink minimum 4,500 psi 7-day strength. Use Five-Star Special Grout 130 or equal.
- I. Water shall be potable, clear, and free from deleterious substances.

2.02. CONNECTING AND SUPPORT DEVICES

- A. Type 304 stainless steel.

2.03. ACCESSORIES

- A. Recessed Reglets - Aluminum or plastic-shaped and flanged to remain in place once cast.
- B. Sealant - Specified in Section 07900, Joint Sealants.

2.04. MIX

- A. Concrete - Minimum 5,000 psi, 28-day strength, air entrained to 6 percent in accordance with ACI 301.

2.05. FABRICATION

- A. Maintain plant records and quality control program during production of precast units. Make records available upon request.
- B. Use rigid molds, constructed to maintain precast unit uniform in shape, size and finish. Molds shall be constructed of steel, plastic coated wood, or fiberglass.
- C. All exposed edges and corners shall have a radius or chamfer to avoid sharp weakened areas that are vulnerable to breakage.
- D. Place recessed flashing reglets continuous and straight.
- E. Locate hoisting devices to permit removal after erection.
- F. All concrete shall be consolidated in the forms by means of internal and/or external vibration to assure high density concrete. Concrete shall be transported, placed and vibrated in a manner that will prevent segregation. Proper care shall be taken to assure that all reinforcing, inserts, etc., remain in the proper location during concrete placement.
- G. Proper curing of all units is required to minimize shrinkage and to obtain concrete design strengths. Stripping of precast units shall not commence until concrete has reached a minimum average strength of 2,500 psi.
- H. Maintain consistent quality during manufacture.
- I. Precast items shall be smooth gray concrete. When possible, exposed surfaces shall be cast against the form with other non-form exposed surfaces steel troweled.
- J. Immediately upon stripping, fill and rub all surface imperfections resulting from air, water, or form oil with a mixture of the same cement and sand as used for the concrete placement. Prior to shipment, the skin (cement paste surface) of all exposed surfaces shall be removed by means to assure a more uniform surface. This etching shall produce a "sand finish" surface similar to sand finish plaster. Surfaces shall be washed with water.
- K. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- L. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.

2.06. FINISH - PRECAST UNITS

- A. Finish Type A - Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

2.07. FABRICATION TOLERANCES

- A. Overall dimensions for small size elements such as mullions, sills, etc., shall not vary more than $\pm 1/4$ inch in length and $\pm 1/8$ inch in a cross section.

- B. Maximum Out of Square - 1/8 inch in 10 feet non-cumulative.
- C. Variation From Dimensions Indicated on Drawings - $\pm 1/4$ inch.
- D. Maximum Misalignment of Anchors, Inserts, Weld Plates - 1/4-inch.
- E. Maximum Bowing of Units - Length of span/360.
- F. Location of Reglets - 1/4-inch from true position.

2.08. SOURCE QUALITY CONTROL AND TESTS

- A. Provide testing and analysis of concrete mix.
- B. Take four concrete test cylinders at least once for each day of production and for every 5 cubic yards of concrete placed in accordance with ASTM C31. One to be broken at 7 days, 2 at 28 days. and 1 held in reserve.
- C. Take slump tests for every batch and/or placement operation, in accordance with ASTM C143.
- D. Perform one air entrainment test for each set of concrete test cylinders taken.
- E. Records of these tests shall be made available to the Engineer upon request.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that building structure, anchors, and openings are ready to receive work of this section.

3.02. PREPARATION

- A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.
- B. Provide necessary hoisting equipment.

3.03. ERECTION

- A. Erect units without damage to shape or finish. Replace or repair damaged units.
- B. Erect units level and plumb within allowable tolerances.
- C. Align and maintain uniform horizontal and vertical joints as erection progresses.
- D. Chips, cracks, spalls or other damaged incurred in storage, shipment and/or erection shall be patched only by the manufacturer to the Engineer's satisfaction, providing the damage is not detrimental to the element's structural function.

E. Exposed Joint Dimension - 3/8 inch.

3.04. ERECTION TOLERANCES

A. Maximum Variation From Plane of Location - 1/4 inch in 10 feet and 3/8 inch in 100 feet, non-cumulative.

B. Maximum Offset From True Alignment Between Two Connecting Units - 1/8 inch.

C. Joint Tolerance - $\pm 1/4$ inch.

END OF SECTION

SECTION 03600

GROUT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Non-shrink grout for setting of equipment, column baseplates, precast units, and other accessories.
- B. Non-shrink grout to patch voids around slab and wall penetrations.

1.02. REFERENCES

The publications listed below form a part of this specification.

- A. American Concrete Institute
 - 1. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
 - 2. ACI 309 - Practice for Consolidation of Concrete
- B. American Society for Testing and Materials
 - 1. ASTM C31 - Method of Making and Curing Concrete Test Specimens in the Field
 - 2. ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm Cube Specimens)
 - 3. ASTM C143 - Test Method for Slump of Portland Cement Concrete
 - 4. ASTM C150 - Portland Cement
 - 5. ASTM C1019 - Standard Method of Sampling and Testing Grout
 - 6. ASTM C1107 - Packaged Dry, Hydraulic-Cement Grout (Non-shrink)

1.03. SUBMITTALS

- A. Submit catalog cut for non-shrink grout.

PART 2 PRODUCTS

2.01. GROUT

- A. Non-Shrink Grout - Shall be a flowable, non-staining, premixed, cement-based, manufactured product, requiring only the addition of water or latex mix solution (supplied by the grout manufacturer) at the job site.

1. For support of equipment and column baseplates, for setting of precast units or other accessories, and for plugging voids around slab and wall penetrations, use grout specifically manufactured for such applications.

Provide Engineer with manufacturer's certification for the uses intended, including 2-inch by 2-inch grout cube strength tests in accordance with ASTM C109. Plastic consistency of grout shall achieve minimum compressive strength of 5,000 psi in 7 days and 7,000 psi in 28 days.

2. Non-shrink grout shall be applicable for damp, corrosive environments.
- B. Grout for patching and plugging concrete surfaces shall be as specified in Section 03300, Cast-in-Place Concrete.
 - C. Grout for reinforced masonry shall be as specified in Section 04300, Unit Masonry System.
 - D. Adhesive anchor systems shall be used to install all bolts, anchors, and reinforcing bar dowels into concrete and/or masonry, as specified in Section 05505, Concrete And Masonry Anchors.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Prepare surfaces, mix product, and install grout per manufacturer's instructions.
- B. Provide curing of the grout per manufacturer's recommendations.

END OF SECTION

SECTION 03732

CONCRETE REPAIR

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Preparation of concrete and application of repair materials for cracks, spalls, and deteriorated concrete.
- B. Repair of steel reinforcing bars.
- C. Coatings for concrete repairs and for existing concrete surfaces.
- D. Repair of failed joint waterstops.
- E. Resealing of existing concrete joints.
- F. Repair to reinforcement at saw cut concrete.
- G. Repair to removed anchor bolts.
- H. Repair to existing concrete damaged by Contractor.
- I. Schedule of repairs.

1.02. REFERENCES

- A. ACI 201.1 - Guide for Conducting a Visual Inspection of Concrete in Service.
- B. ASTM A615 - Deformed Steel Bars for Concrete Reinforcement.
- C. AWS D1.4 - Structural Welding Code for Reinforcing Steel.

1.03. COORDINATION

- A. Contractor shall send a copy of this specification to repair product manufacturers.
- B. Contractor shall coordinate with the repair product manufacturer's representative to visit the site prior to submitting written repair recommendations and final product selection.
- C. Contractor shall consult with the Owner's representative in the field prior to and during the repair procedures to determine extent of repairs.
- D. The product manufacturer's representative shall be made available for consultation with the Contractor or Owner's representative about the proper application during the repair procedures.
- E. Color of selected coating system(s) shall match existing concrete. Owner shall determine acceptability of proposed color prior to application.

1.04. SUBMITTALS

- A. Submit manufacturers' custom written repair recommendations and outline procedures based on product manufacturers' representative's site visit, verified and signed by the Contractor.
- B. Submit single-page product data sheets (catalog cuts) to confirm product selection along with single-page custom written outline installation instructions for proposed repair materials.
- C. Submit certification from product manufacturer attesting to approved Contractor status.
- D. If the Contractor elects to propose a substitute repair product manufacturer for approval, all of the above items shall be submitted for approval along with at least two references from completed projects with similar repairs. These references shall include project and name with phone numbers of the Owner's representative able to attest to quality of the repairs performed on that project.

1.05. QUALITY ASSURANCE

- A. Product Manufacturer - Company specializing in manufacturing the repair products specified in this section.
- B. Applicator - Contractor specializing in concrete repair. The Contractor shall be approved by the manufacturer of the specified product, and have completed a program of instruction in the use of the specified repair material.
- C. Welding of steel reinforcing bars performed in accordance with AWS D1.4.
- D. Contractor and product manufacturer shall propose final product recommendations based on experience and current project conditions.

1.06. SAMPLES AND MOCKUP

- A. Prepare one sample of each type of injection and patching procedure. The sample(s) shall be about 3 feet long, illustrating the continuity and quality of the repair.
- B. Provide mockup of typical spalled patch repair. Mockup shall be a wall surface area 3 feet by 3 feet, illustrating patching method, color, and texture of repaired surface.
- C. Provide mockups of typical concrete coatings. Each type of coating system shall be provided as an individual mockup. Mockups shall be a wall surface area 3 feet by 3 feet, illustrating coating method, color, and texture of coated surface.
- D. Provide mockup of typical joint strip waterstop repair. Mockup shall be one complete, full-height wall joint.
- E. Location of the sample(s) and mockup shall be determined by the Owner's representative.
- F. When accepted, sample(s) and mockup shall demonstrate minimum standard for the work. Approved mockup and sample(s) may remain as part of the work.

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Comply with instructions for storage, shelf life limitations, and handling of repair products.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Sika Corporation.
- B. Euclid Chemical Company.
- C. BASF Chemical Company.
- D. Or equal.

2.02. MATERIALS

- A. General Concrete Repair including Spalls, Delamination, and Deteriorated (Damaged) Concrete

- 1. Sika Corporation Products

- a. Concrete and exposed reinforcement shall be coated with Sika Armatec 110.
- b. Shallow Concrete Loss (Less Than 3 Inches Deep)
 - 1) For vertical surfaces, use a polymer-modified repair mortar such as Sika Top 123 Plus.
 - 2) For horizontal surfaces (tops of walls), repair with Sika Top 122.
- c. Deep Concrete Loss (More Than 3 Inches Deep) – Repairs can either be built up in layers of the appropriate repair mortar used for shallow repairs, or by form-and-pour method using SikaTop 111 Plus.

- 2. Euclid Chemical Company Products

- a. Concrete and exposed reinforcement shall be coated with Duralprep A.C. rust inhibitor primer.
- b. Shallow Concrete Loss (Less Than 3 Inches Deep)
 - 1) For vertical surfaces, use a polymer-modified repair mortar such as Duraltop Gel.
 - 2) For horizontal surfaces (tops of walls), repair with Duraltop Fast Set.

- c. Deep Concrete Loss (More Than 3 Inches Deep) – Repairs can either be built up in layers of the appropriate repair mortar used for shallow repairs, or by form-and-pour method using Euco Crete Supreme.
 - 3. BASF Chemical Company Products
 - a. Concrete and exposed reinforcing steel shall be coated with Emaco P24.
 - b. Shallow Concrete Loss (Less Than 3 Inches Deep)
 - 1) For vertical surfaces, use a polymer-modified repair mortar such as HB2 Repair Mortar.
 - 2) For horizontal surfaces (tops of walls), repair with HB2 Repair Mortar.
 - c. Deep Concrete Loss (More Than 3 Inches Deep) – Repairs can either be built up in layers of the appropriate repair mortar used for shallow repairs, or by form-and-pour method using Emaco FS.
 - 4. Or equal.
- B. Repair of Concrete Structural Cracks (Dry and Not Leaking)
 - 1. Sika Corporation Products
 - a. Horizontal Surfaces - Use Sikadur 35, Hi-Mod LV epoxy resin gravity feed into cracks until filled.
 - b. Vertical Surfaces - Use Sikadur 35, Hi-Mod LV epoxy resin injected into the crack with Sikadur 31 used as an exterior seal.
 - 2. Euclid Chemical Company Products
 - a. Horizontal Surfaces - Use Duralith LV gravity feed into cracks until filled.
 - b. Vertical Surfaces - Use Duralith LV epoxy resin injected into the crack with Duralcrete Gel used as an exterior seal.
 - 3. BASF Chemical Company Products
 - a. Horizontal Surfaces - Use Concreative Standard LVI gravity feed into cracks until filled.
 - b. Vertical Surfaces - Use Concreative Standard LVI epoxy resin injected into the crack with Concreative Paste SPL used as an exterior seal.
 - 4. Or equal.
- C. Repair of Concrete Active (Moving) Cracks (Dry or Leaking)
 - 1. Sika Corporation - Use SikaFix HH+/HH LV hydropobic, polyurethane grout injected into the crack.

2. Euclid Chemical Company - Use Dural Aqua-Fil hydrophilic polyurethane compound injected into the crack.
 3. BASF Chemical Company – Use Concreseive 1210/1230 IUG, hydrophilic polyurethane injected into the crack.
 4. Or equal.
- D. Repair of Excessive Surface Cracking in Slabs - Excessive cracking shall be defined as areas containing “craze cracking” or “map cracking” as defined by ACI 201.1.
1. Sika Corporation - Use Sikadur 55 SLV, epoxy resin penetrating sealer, gravity fed into the cracks.
 2. Euclid Chemical Company - Use Dural 50 LM, acrylated epoxy resin penetrating sealer, gravity fed into the cracks.
 3. BASF Chemical Company – Use EpoXeal GS Structural two-component epoxy penetrating sealer, gravity fed into the cracks.
 4. Or equal.
- E. Concrete Coatings
1. Membrane Coating of Concrete Repairs and Existing Concrete Surfaces Exposed to Process Water
 - a. When using Sika Corporation repair products, apply Sikadur 75 Epocem leveling mortar and Sikagard 62 epoxy coating according to manufacturer’s recommendations.
 - b. When using Euclid Chemical Company repair products, use Duralith Gel with one part silica sand as a leveling mortar. Apply Duraltex 1707 epoxy coating according to manufacturer’s recommendations.
 - c. When using BASF Chemical Company repair products, use SP15 Spray Mortar to level concrete surface. Apply Sewer Guard TG Epoxy Liner according to manufacturer’s recommendations.
 - d. Or equal.
 2. Protective Coating of Concrete Repairs and Existing Concrete Surfaces Not Exposed to Process Water
 - a. When using Sika Corporation products, apply Sikagard 550W elastomeric coating according to manufacturer’s recommendations.
 - b. When using Euclid Chemical Company products, apply Tammolstic elastomeric coating according to manufacturer’s recommendations.
 - c. When using BASF Chemical Company products, apply Elastocoat elastomeric coating according to manufacturer’s recommendations.

d. Or equal.

F. Joint Waterstop Repairs (Using Surface-Applied Joint Strip System)

1. Sika Corporation “Sikadur Combiflex” system consisting of:
 - a. Combiflex perforated Hypalon sealing strip, minimum 8 inches wide.
 - b. Sikadur 31, Hi-Mod Gel epoxy adhesive.
2. Euclid Chemical Company “Vandex Flextape System” consisting of:
 - a. Vandex Flextape thermoplastic elastomer (TPE) seal strip, minimum 8 inches wide.
 - b. Vandex Flextape Epoxy Adhesive.
3. Or equal.

G. Concrete Joint Sealant

1. For process tanks and other submerged conditions, use a polyurethane sealant designed for submerged conditions to either contain or hold out liquids. Provide sealant as specified in Section 03250, Concrete Joints and Accessories.
2. For non-submerged conditions, provide sealant as specified in Section 07900, Joint Sealants.

H. Repair of Saw Cut Concrete and Removed Anchor Bolts

1. Patch penetration in concrete with a plug mortar.
2. Plug mortar shall be a fast setting hydraulic cement compound that can immediately stop running water or seepage leaks in concrete. Use Sika Corporation “SikaSet Plug,” BASF Chemical Company “Waterplug,” Euclid Chemical Company “Speed Plug,” or equal.

2.03. REINFORCEMENT MATERIALS

- A. Steel Reinforcing Bars - ASTM A615, Grade 60, deformed bars.
- B. Splicing Sleeves - Mechanical wedge type; “Quick-Wedge” manufactured by ERICO Concrete Construction Products or equal.

PART 3 EXECUTION

3.01. IDENTIFICATION AND EXTENT OF REPAIRS

- A. Provide repairs as identified in the Schedule of Repairs at the end of this section.

- B. Surface Repairs - At all areas to be coated, any deteriorated concrete surface not suitable for approved coating system.
- C. Unidentified Miscellaneous Repairs - Areas identified by the Owner's representative that are not listed in the Schedule of Repairs. This repair work is to be performed in accordance with Section 01025, Unit Price Items, for unit price items.

3.02. EXTENT OF COATING

- A. Coat all repaired surface areas. If more than 50 percent of the wall surface area is repaired, all of the wall surface shall be coated.
- B. Coat all existing concrete surfaces identified in the Schedule of Repairs.

3.03. EXAMINATION

- A. The Contractor shall coordinate with the Owner's representative and the Schedule of Repairs to determine which areas will be repaired and the extent of those repairs.
- B. Verify that surfaces are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.

3.04. PREPARATION

- A. General Concrete Repairs Including Spalls, Delamination, and Deteriorated (Damaged) Concrete
 - 1. To remove weak, spalled, delaminated, or other unsound concrete, use a 20-lb. chipping hammer.
 - 2. At exposed reinforcing steel, abrasive blast to remove rust. Remove enough concrete around reinforcing bars to provide access. Splice in new reinforcing if section loss is more than 15 to 25 percent or as determined by Owner's representative.
 - 3. Abrasive blast all concrete areas to be repaired to obtain surface profile as recommended by product manufacturer.
 - 4. Saw cut as required to avoid feather edging of repair material and to provide a neat, finished appearance.
 - 5. Use high pressure water to clean areas prior to repairs.
 - 6. Use polymer-modified repair products installed per manufacturer's recommendations.
 - 7. At areas to be coated, use either a brush-off blast or high pressure water blast at 4,000 to 6,000 psi to remove all existing tank coatings and surface contaminants and to prepare surface for coating. Remaining coatings and surface contaminants not removed by blasting shall be removed by other mechanical means, including grinding.

- B. Structural Cracks (Dry and Not Leaking) - Structural cracks (determined by Engineer) shall be repaired utilizing a low viscosity, 100 percent solids, two-component epoxy resin system. Remove all dust, debris or disintegrated material from crack by use of oil-free compressed air or vacuuming, or by other approved methods as may be required by manufacturer.

Crack must be dry at time of application.

1. Horizontal Surfaces - "Vee" out cracks in the concrete surface. Apply epoxy in accordance with manufacturer's recommendations.
 2. Vertical Surfaces - Patching of vertical wall cracks shall be accomplished by pressure injection of epoxy resin, as recommended by the repair materials manufacturer.
 3. Provide temporary entry ports spaced to accomplish movement of fluids between ports. Limit port size diameter to be no greater than the thickness of the crack. Provide temporary seal at concrete surface(s) to prevent leakage of epoxy resin.
- C. Active (Moving) Cracks (Dry or Leaking) – Moving and/or leaking cracks (determined by Engineer) shall be repaired utilizing a low viscosity, hydrophobic or hydrophilic, closed cell polyurethane compound injection system that will function as a flexible gasket.
1. Lightly grind crack surface to remove efflorescence and to expose/open up the face of the crack.
 2. Starting 6 inches away from the crack, drill injection holes at 45 degrees to intersect the crack at about mid-depth of concrete member, but at least a minimum of 6 inches deep from the crack surface. Holes shall be placed alternating along sides of crack.
 3. Provide temporary entry ports in these drilled holes spaced 12 to 18 inches or as required to accomplish movement of fluid between ports. It may be necessary to decrease the spacing of entry ports to properly inject the polyurethane compound.
- D. Excessive surface cracking in concrete slabs shall receive a penetrating epoxy resin sealer to seal the cracks.
1. Pressure wash the existing concrete surface and clean out the cracks.
 2. "Vee" out cracks in the slab surface as recommended by repair material manufacturer.
 3. Surface preparations shall be in accordance with the manufacturer's recommendations.

In the event that excessive cracking occurs in isolated areas of a given concrete slab, sealer could only be required in the area of the cracks bounded by construction or control joints

- E. Concrete Coatings - Surface cleaning, existing coating removal (where applicable), and surface profiles shall be achieved by abrasive blasting or grinding to the specifications required by the coating product manufacturer. Coatings (and leveling mortar if applicable) shall be applied to all surfaces specified.

F. Joint Waterstop Repairs (Strip System)

1. Remove all loose (unsound) concrete and foreign material along joint.
2. At base of wall joint, chip out concrete in base slab (approximately 3-inch depth) to allow for continual installation of waterstop down into the base slab.
3. Abrasive blast to clean surfaces and obtain surface profile as recommended by product manufacturer.

G. Concrete Joint Sealants – Remove all existing sealants (and backer rods) and abrasive blast to clean out concrete joints.

H. Repair reinforcing bars by welding new bar reinforcement to existing reinforcement or by installing sleeve splices. Strength of welded and spliced reinforcement shall exceed that of the reinforcing bar.

3.05. APPLICATION

A. Repair Mortar (Trowel Applied)

1. Trowel apply mortar mix. Tamp into place, filling voids at honeycomb and spalled areas.
2. Bring surface flush with surrounding area. Finish trowel surface to match surrounding area.
3. Cure per manufacturer's specifications.

B. Repair Mortar (Form-and-Pour)

1. Provide rigid forms around the repair areas to receive pourable repair mortar.
2. Pour repair mortar into the forms. Tamp and vibrate as needed to eliminate the creation of air voids.
3. Bring surface flush with surrounding area. Finish trowel exposed surface(s) to match surrounding area.
4. Cure per manufacturer's specifications.
5. Rub the cured repair surface to blend in with existing surrounding unrepaired surfaces.

C. Crack Injection of Epoxy Resin and Polyurethane Compound

1. Inject material into prepared ports under pressure using automated equipment appropriate for application.
2. For polyurethane injections, inject water into the crack to thoroughly flush out the crack to remove dirt, dust, and contaminants. Follow flush water by injecting polyurethane compound (with accelerating catalyst as required.)

3. Begin injection at lower entry port and continue until fluid appears in adjacent entry port. Continue from port to port until entire crack is filled.
4. Remove temporary surface seal (if applicable) and excess injection material. Grind surface as needed.
5. Clean surfaces of repair area and blend finish with surrounding area.

D. Excessive Surface Cracking

1. Prime surface as required by product manufacturer.
2. Apply product over surface and squeegee into the cracks.
3. Remove excess material from surface and/or broadcast aggregate into product to create a non-slip surface.
4. Mixing, application and finishing of product shall be in accordance with the manufacturer's recommendations.

E. Concrete Coatings

1. Prior to coating existing or new concrete areas, all repairs shall be fully cured and new concrete shall be at least 28 days old.
2. All areas to be coated shall first be prepared using a leveling mortar and a brush off sandblasting to achieve surface profile as required by manufacturer's instructions to obtain a durable final coating.
3. Apply coating system in accordance with manufacturer's instructions. If required, broadcast in sand for UV protection in accordance with product requirements.
4. The end result will leave all surfaces with a uniform color and neat appearance.

F. Joint Waterstop Repairs (Strip System)

1. Follow all installation instructions in accordance with manufacturer's specifications.
2. Apply epoxy adhesive on each side of joint, but not up to the edge of joint.
3. Press sealing strip firmly into epoxy adhesive; bridging over joint with slight bellow to allow for movement. The strip shall also extend down into the chipped out area in the base slab and make contact with existing waterstop, where possible.
4. Apply a second coat of epoxy adhesive over ends of sealing strip.
5. Joint system shall be installed as one continuous strip from top of base slab to top of wall. (When splicing is required, thermal weld and lap splice per manufacturer's specifications.)

6. To provide continuity of this waterstop strip to the existing embedded waterstop in the base slab, inject polyurethane sealant into the base slab joint and behind the waterstop strip at the bottom.
- G. Concrete Joints - Clean out and reseal all existing construction and/or control joints.
- H. Saw Cut Concrete - At all areas on the project, after saw cutting concrete, repair exposed reinforcement as follows:
 1. Chip back concrete around rebar end.
 2. Cut off exposed reinforcement minimum 1-1/2 inches beyond concrete surface.
 3. Prepare surface to a saturated, surface-dry condition and patch hole with plug mortar.
- I. Repair to Removed Anchor Bolts – Existing exposed anchor bolts that are no longer used shall be cut off and patched in the same manner as the repair of exposed reinforcement in saw cut concrete (indicated above).

3.06. QUALITY CONTROL

- A. The Contractor shall:
 1. Coordinate to have the manufacturer's representative on site during installation to offer inspection and technical guidance.
 2. Maintain suitable temperature throughout application.
 3. Cure products following manufacturer's recommendations.

3.07. SCHEDULE OF REPAIRS

Repair Location	Item	Repair Type

END OF SECTION

SECTION 04300

UNIT MASONRY SYSTEM

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Provide masonry wall construction in accordance with the Contract Documents including, but not limited to, the following:
1. Exterior cavity walls with CMU structural wythe and clay brick veneer.
 2. Factory pre-mixed mortar.
 3. Grout.
 4. Reinforcement, anchorage, and accessories.
 5. Interior CMU walls

1.02. REFERENCES

ACI 530	Building Code Requirements for Masonry Structures and Related Commentaries
ACI 530.1	Specification for Masonry Structures and Related Commentaries
ASTM A82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A1008	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A951	Standard Specification for Masonry Joint Reinforcement
ASTM C67	Standard Specification for Sampling and Testing Brick and Structural Clay Tile
ASTM C90	Standard Specification for Loadbearing Concrete Masonry Units
ASTM C140	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C216	Specification for Facing Brick (Solid Masonry Units made from Clay or Shale
ASTM C270	Standard Test Method for Mortar for Unit Masonry
ASTM C476	Standard Specifications for Grout for Masonry
ASTM C780	Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C979	Standard Specification for Pigments for Integrally Colored Concrete
ASTM C1019	Standard Test Method for Sampling and Testing Grout
ASTM C1093	Standard Practice for the Accreditation of Testing Agencies for Masonry
NCMA	National Concrete Masonry Association

1.03. PRECONSTRUCTION SUBMITTALS

- A. Obtain written approval of submittals prior to use of the materials. Submit all masonry materials and accessories as one submittal. Incomplete submittals will be returned “Revise and Resubmit.”
- B. Provide test results from an independent laboratory certified according to ASTM C1093 or employing technicians with a current “Certification in Concrete Masonry Testing” by the National Concrete Masonry Association.
 - 1. All required data shall be dated within 24 months or less prior to the date the submittal is received by the Engineer.
- C. Provide sampling, test data, and certificates for CMU.
 - 1. Submit ASTM C140 test reports demonstrating compliance with ASTM C90.
 - 2. Samples obtained for ASTM C140 tests shall have the same configuration, dimension, concrete mix, and curing methods as CMU proposed for use in building construction. Test results for 8 x 8 x 16 stretcher units are sufficient.
- D. Provide test results for brick units.
 - 1. Submit test results per ASTM C216 and ASTM C67 for the following:
 - a. Grade of brick units.
 - b. Initial rate of absorption.
 - c. Compressive strength.
 - d. Testing for water absorption.
 - e. Dimensional tolerances.
 - 2. Samples used in ASTM C67 tests shall have the same composition, method of manufacture, configuration and dimension as brick proposed for use in the project.
- E. Factory Premixed Mortar - For each type of mortar that is proposed for use in the project, submit test results from a certified laboratory demonstrating that the mortar mix meets the property specification requirements of ASTM C270.
- F. Grout - Provide test data for grout mix demonstrating compliance with ASTM C476 and showing the compressive strength from ASTM C1019 testing.
- G. Provide manufacturer’s product data sheets for all products listed under Article 2.07 of this section. Product data sheets shall be clearly marked up by Contractor indicating selected items that conform to Drawings and specifications. Mark the relevant item description, model number, material type, size, etc. as appropriate for the type of product.

- H. Provide banded stacks (minimum five-brick stack) of actual samples of proposed brick matching existing adjacent building. Samples shall demonstrate color, texture, and blend match.

1.04. SUBMITTALS DURING CONSTRUCTION

- A. Provide field evaluation tests required by Article 3.19 of this section as separately numbered submittals for each day that samples are taken.
- B. Submit test data for field evaluation tests to the Engineer within 10 days of receipt of the test data by the Contractor.

1.05. QUALITY ASSURANCE

- A. Perform work in accordance with ACI 530, 530.1, listed references, and this specification.
- B. Where conflicts occur between current referenced publications and this specification, the more restrictive requirements shall apply.
- C. Failure to detect defective work or material does not prevent later rejection.

1.06. REGULATORY REQUIREMENTS

- A. Where fire-resistance ratings for walls are shown on drawings: walls are to be designed to provide the required fire resistance by a method acceptable to Section 703.3 of the 2015 International Building Code including calculated fire resistance per Section 722 of the Code and ACI 216.
- B. Provide access to the work as needed for Special Inspections as required by Chapter 17 of the 2010 Building Code of New York State.
 - 1. Reference Section 01420, Special Inspections, for special inspection requirements.
- C. Completed exterior wall assemblies including insulation, vapor barrier, air barrier, weather barrier, flashing, sealants, and adhesives are to match that of an assembly that has been tested and met the requirements of NFPA 285, or match that of an assembly described in an ICC-ES Evaluation Report that certifies the assembly as meeting IBC Section 2603.5.

1.07. ENVIRONMENTAL REQUIREMENTS

- A. Adhere to ACI 530.1, Part 1.8 C, "Cold Weather Construction," when the ambient temperature or the temperature of masonry units is 40 degrees F or less.
- B. Adhere to ACI 530.1 Part 1.8 D, "Hot Weather Construction," when ambient temperature is 90 degrees F or greater.

1.08. MOCK-UP PANELS

- A. All submittals must be approved before the mock-up is constructed. The mock-up is not to be used for color selection. Unit masonry color will be pre-selected from the submittals.

- B. The mock-up shall be constructed using masonry units from the same lot as will be used in project construction, so the full range of colors, textures, and finishes that can be expected on the project will be demonstrated on the panel.
- C. Provide mock-up facing south and in direct sunlight.
- D. Mock-up shall be constructed according to the design shown on the Drawings of all approved materials which include, but are not limited to, brick, block, insulated metal wall panel, mortar, reinforcing vapor barrier, insulation, anchors, mortar control flashing, lintels, vents, weeps, grooved bond beam, opening with lintels, precast concrete sill, coping, and belt course, vertical reinforcing, caulked and uncaulked, expansion/control joints, etc. Workmanship elements include, but are not limited to, bonding, coursing, joint thickness, and tooling.
- E. Additional mock-ups shall be constructed until accepted by the Engineer. Accepted mock-up demonstrates new standard for work. Mock-up may not remain as part of the work.

1.09. DELIVERY, STORAGE, AND HANDLING

- A. Inspect masonry units for damage. Return damaged units exceeding ASTM Standards.
- B. Store to permit air circulation while preventing moisture intrusion.
- C. Factory premixed mortar accepted in unbroken, labeled packaging. Return hardened, partially set, caked, contaminated, or deteriorated materials.
- D. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.10. SEQUENCING AND SCHEDULING

- A. Coordinate work with related products, including those listed in Article 1.02 of this section.

PART 2 PRODUCTS

2.01. MANUFACTURERS - CONCRETE MASONRY UNITS AND ARCHITECTURAL CONCRETE MASONRY UNITS

- A. Palumbo Block Co., Inc., Dover Plains, NY
- B. Kingston Block & Masonry Supply LLC, Kingston, NY
- C. Oneonta Block Company, Oneonta, NY
- D. Federal Block Corp., New Windsor, NY
- E. Or equal NCMA member plant.

2.02. CONCRETE MASONRY UNITS

- A. Hollow and Solid Load Bearing Block Units - ASTM C90, normal weight, 1900 psi compressive strength.
- B. Standard Block Units - ASTM C90, 1900 psi compressive strength - (maximum absorption 8 percent); Standard gray color.
- C. Size and Shape – Provide standard hollow blocks for running bond installation, and special units as listed below:
 - 1. Jamb Blocks – 8-inch long and 16-inch long units to provide flat and smooth face surrounding openings.
 - 2. Bond Beam Units - 8 inches high with knock-out webs, stacked to create the height shown on drawings.
 - 3. Lintel Units - 8 inches high or 16 inches high with solid bottoms and open ends or as shown on the Drawings.
 - 4. Solid Units – Nominal 2-, 4- and 6-inch thick units without cores for use where shown on Drawings.

2.03. MANUFACTURERS – CLAY BRICK UNITS

- A. Glen-Gery Corporation, Wyomissing, PA
- B. The Belden Brick Company, Canton, OH
- C. Acme Brick Company, Fort Worth, TX
- D. Or equal.

2.04. CLAY BRICK UNITS

- A. Face Brick – ASTM, Grade SW. Color as selected to match Westchester County’s Main Street Pump Station..

2.05. FACTORY PREMIX MORTAR

- A. Provide factory premixed mortar, including all ingredients except water, for use with concrete masonry units and face brick.
- B. Premixed products manufactured by:
 - 1. The Quikrete Companies, Atlanta, GA.
 - 2. Spec Mix, Inc., Eagan, MN.
 - 3. Or equal.
- C. ASTM C270 Type N for use with clay brick.

- D. ASTM C270 Type S for use with concrete masonry units.
- E. Antifreeze compounds are prohibited.
- F. Admixtures containing chlorides are prohibited.
- G. For mortar for use with clay brick, provide light gray mortar. Use mineral oxide pigments compliant with ASTM C979. Color to be selected by Engineer.
 - 1. Solomon Grind-Chem Service, Inc.
 - 2. Davis Colors.
 - 3. Or equal.

2.06. GROUT

- A. Grout for use in concrete masonry walls shall comply with ASTM C476 and shall develop a minimum compressive strength of 3,500 psi at 28 days.
- B. Fine grout shall contain only fine aggregate.
- C. Coarse grout shall contain fine and coarse aggregate.
- D. Aggregates shall comply with ASTM C404.
- E. Allowable Grout Pour Heights

Grout Type	Maximum Grout Pour Height (feet)	Minimum Grout Space Dimensions (in. x in.)
Fine	1	1-1/2 x 2
Fine	5	2 x 3
Fine	12	2-1/2 x 3
Coarse	1	1-1/2 x 3
Coarse	5	2-1/2 x 3
Coarse	12	3 x 3

- 1. Grout space dimension is the clear dimension between any masonry protrusion and shall be increased by the diameters of any horizontal bars within the grout space.
- F. All grout shall be of fluid consistency with a slump of 8 to 10 inches.
- G. Antifreeze compounds are prohibited.
- H. Admixtures containing chlorides are prohibited.

2.07. MANUFACTURERS - REINFORCEMENT, ANCHORAGE, FLASHINGS, AND ACCESSORIES

- A. Wire-Bond, Inc., Charlotte, NC.
- B. Hohmann & Barnard, Inc., Hauppauge, NY.
- C. Or equal.

2.08. REINFORCEMENT, ANCHORAGE, FLASHINGS, AND ACCESSORIES

- A. Reinforcement, anchorage, and accessories to be as shown in the following table:

Component	Wire-Bond Item	Hohmann & Barnard Item
Adjustable Veneer Tie and Horizontal Joint Reinforcement - Ladder configuration, 9 gage cross ties spaced 16 inches O.C.; 9 gage side rods, 3/16-inch eye and pintle wires, 9 gage seismic veneer wire; hot dip galvanized.	Series 800 Level Eye Ladder with plastic seismic clip	Ladder Type #270 with Seismicclip Interlock System
Adjustable Veneer Tie with offset channel slot and slot anchor: hot dip galvanized.	#1301-X channel slot with slot anchor #2103	Gripstay 362-CX with Gripstay slot anchor head 363
Compressible Filler for Horizontal Joints - Closed cell neoprene sponge, 1/4-inch by 2-3/4-inch minimum or other dimensions as detailed, self-adhesive backing where beneficial for ease of construction.	#3300	#NS – Closed Cell Neoprene Sponge
Compressible Filler for Vertical Joints - Closed cell neoprene sponge; thickness as detailed, width as needed to fill entire joint except for sealant depth.	#3300	#NS – Closed Cell Neoprene Sponge
Rubber control joint.	#2902	RS-8 or RS-12
Joint Stabilizing Anchor – Hot dip galvanized with 3/16-inch rods, allowing movement parallel to wall.	#1700	#”Slip-Set” Stabilizer
Vertical Bar Positioner – Hot Dip Galvanized 9 gage wire to position vertical reinforcement at location in grouted cells as detailed	#3403 or #3404 – Rebar Positioners	#RB or #RB-Twin Rebar Positioners
Cavity Grout Support - Fabric mesh to block flow of grout below desired elevation, 1/2-inch maximum openings in mesh; non-corrosive fibers.	#3612	#MGS- Mortar/Grout Screen
Weep and Vent Inserts - Full height of head joint, polypropylene, multiple hexagon or round tube configuration, color gray.	#3601 Cell Vents	#QV – Quadro-Vent
Mortar Drop Control Device - Staggered height plastic device designed to catch and suspend dripped mortar above weep height.	Cavity Net DT	# Mortar Net

B. Cleaning Solutions

1. Mortar and Grout Remover by ProSo Company, Inc.
2. Efflorescence Control System by ProSo Company, Inc.
3. Or equal.

C. Air and Vapor Barrier (AVB) – Specified, submitted, and approved in Section 07190, Vapor and Air Barriers.

D. Control Joint Materials in the Plane of the AVB - Specified, submitted, and approved in Section 07190, Vapor and Air Barriers.

E. Base Flashings, End Dams, Lap Sealants and Termination Sealants Installed at Wall Base and Lintel Angles - Specified, submitted, and approved in Section 07190, Vapor and Air Barriers.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that field conditions are acceptable and ready to receive work.
- B. Beginning of installation means installer accepts existing conditions.
- C. New masonry work installed into or adjacent to existing conditions shall match existing construction unless otherwise instructed.
- D. Items provided by other sections shall be properly sized and located.
- E. Ensure that built-in items are in proper location, and ready for roughing into masonry work.

3.02. PREPARATION

- A. Direct and coordinate placement of metal anchors or reinforcing supplied by other sections.
- B. Provide bracing of masonry construction. Maintain in place until building structure provides permanent bracing.

3.03. FACTORY PRE-MIX MORTAR

- A. Factory premix mortar requires strict adherence to manufacturer's instructions and recommendations.
- B. Hand mixing of mortars is not allowed.

3.04. TOLERANCES

- A. Site tolerances per ACI 530.1 apply, with the following exceptions:

Dimension of Elements	
Mortar Joint Thickness	
Head	+1/8 inch
Collar	+1/8 inch
Grout space or cavity width no exceptions	-1/4 inch, + 3/8 inch

3.05. COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain courses to uniform dimension.
- C. Form bed and head joints of uniform thickness.
- D. Lay concrete masonry units in running bond.
1. Coursing - One unit and one bed joint to equal 8 inches.
- E. Lay exterior veneer (Split face) units in running bond.
1. Coursing - Two units and two bed joint to equal 8 inches.
- F. Mortar Joints Exposed to View - Tooled concave.
- G. Cut mortar joints flush where below grade and where AVB, parging, waterproofing, or damp proofing are to be applied.

3.06. PLACING AND BONDING

- A. Lay first course in full bed of mortar.
- B. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- C. Lay hollow masonry units with full face shell mortar coverage on head and bed joints.
- D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- E. Buttering corners of joints or excessive furrowing of mortar joints are prohibited.
- F. Remove excess mortar as Work progresses and provide full joinery to prevent moisture intrusions.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Units with broken corners or edges shall not be used in exposed work.

- H. Return facing wythe against back-up wythe closing cavity off at all jamb openings. Install 1/2-inch thick compressible filler and sealant at joint between facing and back-up wythes.
- I. Interlock external corners.
- J. Isolate masonry partitions from vertical structural steel or concrete framing members with movement joint.
- K. Isolate non-bearing masonry partitions from structure above with compressible filler or as indicated on Drawings.
- L. Unfinished Masonry: Protect at day's end with secured weatherproof covers. Step back for joining new work, no toothing permitted. Remove loose mortar, expose joint, and wet masonry only as required by ACI 530 and ACI 530.1.
- M. Replace frozen mortar at Contractor's expense.

3.07. VENTS AND WEEPS

- A. Install cavity vents in exterior wythe at 16 inches on center horizontally at top of cavity wall air space.
- B. Install cavity weeps in exterior wythe at bottom of cavity wall air space and above flashing; align with vents above.
- C. Install cavity weeps above lintels, shelf angles, and other flashing locations.

3.08. CAVITY AND SINGLE WYTHER WALLS

- A. Build inner wythe ahead of outer wythe.
- B. Install insulation between horizontal joint reinforcing and hold in place with adhesive that is compatible with AVB specified in Section 07190, Vapor and Air Barriers.
 - 1. Coordinate with installation of flashings and fluid-applied air and vapor barrier specified in Section 07190, Vapor and Air Barriers.
- C. Provide closure of air space for the full height of the wall cavity at building corners, utilizing insulation board.
- D. Mortar shall not accumulate in cavity air space or plug cavity weeps. Install mortar drop control device per manufacturer's instructions at base of cavity, above lintels, and at other locations recommended by manufacturer.
- E. Bevel mortar bed joint next to airspace to reduce falling mortar.
- F. Build interior masonry walls full height or as shown on Contract Drawings.

3.09. REINFORCEMENT AND ANCHORAGES

- A. Provide bond beams, lintels, and vertically reinforced masonry as required by Contract Documents for all walls; interior and exterior, bearing and non-bearing.

- B. Horizontal joint reinforcement shall be continuous; install 16 inches o.c.
 - 1. Lap straight runs and prefabricated corners and tees 9 inches. 6 inches.
 - 2. Place first row in second joint above foundation, above bond beam course.
 - 3. Place in first joint below top of walls.
 - 4. In first joint, above and below openings:
 - a. Extend 16 inches each side.
 - 5. Under bond beam.
- C. Veneer ties shall be installed at maximum 16 inches o.c. vertically and horizontally. Place around perimeter of openings, within 12 inches of openings.
- D. Bridge across control joints using continuous rubber control joint moldings.
- E. Connect new to existing masonry using joint-stabilizing anchors. Anchors shall be bent to form a 90-degree "L." The stationary (vertical) leg shall be fastened to the existing wall.
- F. Connect interior masonry and exterior masonry wall using joint stabilizing anchors at 32 inches o.c., set in grout filled cavities supported by cavity grout support.

3.10. GROUTED AND REINFORCED COMPONENTS

- A. Grout for bond beams, pilasters, etc., as specified in Part 2.
- B. Lay masonry units with core cells vertically aligned, unobstructed and clear of mortar.
- C. Reinforcing steel per Section 03200, Concrete Reinforcement.
- D. Retain vertical reinforcement in position at top and bottom of cells. Splice reinforcement per Section 03200, Concrete Reinforcement.
- E. Consolidate grout without displacing reinforcing.
- F. When grouting is stopped for more than one hour, terminate grout 1-1/2 inches below top of upper masonry unit to form a positive key.
- G. Low Lift Grouting - Place first lift of grout to 16 inches height, rod and vibrate for consolidation. Place subsequent lifts in 8-inch increments, rod and vibrate for consolidation.
- H. High Lift Grouting
 - 1. Provide cleanout opening no less than 4 inches high at bottom of each grouted cell by cutting one face shell of masonry unit. Space cleanouts 32 inches o.c., maximum, in solid grouted masonry.

2. Clean out masonry cells with high pressure water spray prior to grouting and permit complete water drainage.
 3. After inspection by Owner's representative, seal openings with masonry units.
 4. Pump grout into spaces with tremie or vibrate. Maintain water content in grout to intended slump without aggregate segregation.
 5. Limit grout lift to 48 inches, rod and vibrate for consolidation. Wait 30 to 60 minutes before placing next lift.
- I. Grout Slump Test - Test slump of each batch of grout produced. Submit test results to Owner's representative within 24 hours of each test.

3.11. MASONRY FLASHINGS

- A. To be furnished and installed under the requirements of Section 07190, Vapor and Air Barriers.

3.12. LINTELS

- A. Provide reinforced concrete masonry unit lintels over openings where steel or precast concrete lintels are not indicated or specified in Contract Documents.
- B. Set in mortar beds at proper elevation.
- C. Use 16-inch deep lintel block units with solid bottoms.
- D. Do not splice reinforcing bars.
- E. Maintain minimum 8-inch bearing on each side of opening.
- F. Provide bond break where indicated on Drawings.

3.13. MOVEMENT JOINTS

- A. Movement joints shall be classified and installed using the following:
1. Veneer Expansion Joint - Separates masonry veneer into segments to prevent cracking.
 2. Masonry Control Joint - Separates concrete masonry into segments to prevent cracking due to movement. Continuous rubber control joint moldings are to be installed across joints to maintain alignment between segments.
 3. Building Expansion (Isolation) Joint - Through-the-building joint that separates the building into discrete sections, so that stresses developed in one section do not affect the integrity of the entire structure.
- B. Install movement joints as specified or detailed at locations indicated on Drawings.

- C. Do not continue horizontal joint reinforcement through movement joints, except at bond beams.
- D. Do not bridge control joint with mortar.
- E. Movement joints shall be constructed as a continuous vertical line from the foundation to the top of the wall, interrupted only by bond beams. Movement joints shall be continued through parapet walls.
- F. Form building expansion joint as indicated.

3.14. BUILT-IN WORK

- A. Embed items furnished by other sections where indicated on Drawings or specified.
- B. Embed anchor bolts and plates solidly in grout where indicated on Drawings.
- C. Coordinate spacing and placement of built-in items with other trades.
- D. Place items plumb, level, or in proper alignment for their intended use.

3.15. MORTAR QUALITY CONTROL

- A. Adhere to the following:
 - 1. Retain the same material sources throughout project.
 - 2. Consistent proportions of all components, particularly water-premix ratios.
 - 3. Minimal re-tempering to avoid color variations and structural weakening.
 - 4. No acid cleaning. Excessive or too early cleaning of any kind may damage mortar.
 - 5. Tool thumbprint hard joints; too soft a joint will lighten mortar color and too hard a joint will darken color.
 - 6. Unused mortar shall be discarded within 2-1/2 hours after initial mixing.

3.16. CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, and pilasters. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain Engineer's approval prior to cutting or fitting masonry work where not indicated, or where appearance or strength of masonry work may be impaired.

3.17. CLEANING

- A. Remove excess mortar and mortar smears without degrading mortar bond integrity.
- B. Replace defective mortar and masonry units.

- C. Clean soiled and effloresced surfaces.
- D. Use non-metallic tools in cleaning operations.

3.18. PROTECTION OF FINISHED WORK

- A. Without damaging completed work, provide protective boards at exposed external corners and surfaces which may be damaged by construction activities.

3.19. FIELD EVALUATION TESTING

- A. Field testing shall be scheduled by the Contractor and paid for by the Owner.
- B. Provide test results from an independent laboratory certified according to ASTM C1093 or employing technicians with a current "Certification in Concrete Masonry Testing" by the National Concrete Masonry Association.
- C. Tests Required
 - 1. Collect and test one set of mortar samples for each day mortar is used on the project.
 - 2. Collect and test separate samples for each type of mortar used on any particular day.
 - 3. Collect and test one set of grout samples for each day grout is used on the project.
 - 4. Collect and test separate samples for each type of grout used on any particular day.
- D. Mortar Testing - Test for plastic and hardened properties per ASTM C780. Include the following:
 - 1. Mortar-water content determination (ASTM C780, Annex A4).
 - 2. Mortar-air ratio (ASTM C780, Annex A5).
 - 3. Compressive strength tests (ASTM C780, Annex A6).
- E. Grout Compressive Strength Testing
 - 1. Perform grout compressive strength tests in accordance with ASTM C1019.
 - 2. One grout sample (three specimens comprise one sample) shall be tested for each grout mix design used on this project.

END OF SECTION

SECTION 05425

STEEL ROOF TRUSSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-engineered, pre-fabricated, light gauge cold-formed steel framing elements. Work includes supply, fabrication, and installation of:
 - 1. Steel roof truss system.
 - 2. Anchorage, bracing, and bridging.
 - 3. Fasteners and welding as required to secure trusses to supporting structure.

1.02 REFERENCES

- A. ASTM
 - 1. ASTM A653, Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.”
 - 2. ASTM A780 “Repair of Hot-Dip Galvanized Coatings.”
- B. Cold-Formed Steel Engineers Institute (CFSEI)
 - 1. Field Installation Guide.
 - 2. Technical Note 551d – Design Guide for Construction Bracing.
 - 3. Technical Note 551e – Design Guide for Permanent Bracing.
- C. American Welding Society (AWS)
 - 1. AWS D1.1 “Structural Welding Code - Steel.”
 - 2. AWS D1.3 “Structural Welding Code - Sheet Steel.”
- D. American Iron and Steel Institute (AISI)
 - 1. S214 – Truss Design.
 - 2. CF06 – Structural Framing.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance - Design, engineer, fabricate, and erect cold-formed steel trusses to withstand specified design loads.

1. Design Loads - As specified for the project on the structural drawings, including unbalanced snow loading conditions.
2. Deflections - Vertical live load deflection of roof trusses shall be less than $1/240$ of the span.
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 degrees F (67 degrees C).

1.04 SUBMITTALS

- A. Submit manufacturer's qualification statement including affiliation with the CFSEI.
- B. Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required.
- C. Submit shop drawings showing member, type, location, spacing, size, and gage of members, method of attachment to supporting members, and all necessary erection details.
- D. Indicate supplemental bracing, strapping, splices, bridging, accessories, and details required for proper installation.
- E. Submit detailed roof truss system layouts.
- F. Submit truss drawings that include:
 1. Description of design criteria.
 2. Truss member sizes, gauges, and connections at truss joints.
 3. Truss support reactions.
 4. Top chord, bottom chord, and web bracing requirements.
- G. Submit two complete copies of calculations for the truss system provided to this project. Calculations shall be sealed and signed by the professional engineer registered in the State of New York who is responsible for the design. Calculations are for file copy only. Owner's Engineer will not check, approve, or return these calculations.
- H. The sealed calculations shall include a summary page to list all design loads, material specifications, and design criterion used in the calculations.
- I. Submit letter from truss system engineer naming the truss fabricator and stating acceptance by the system engineer of the fabricator.
- J. Submit letter from truss system engineer and/or fabricator naming the truss installer and stating acceptance by the system engineer and/or fabricator of the installer.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications - Fabrication shall be performed by a cold-formed steel truss fabricator with experience designing and fabricating cold-formed steel truss systems equal in material, design, and extent to the systems required for this project. Company and/or engineers on staff shall be members of the CRSEI.
- B. Installer Qualifications – Installation shall be performed by an experienced installer approved by the steel truss system fabricator.
- C. Welding Standards - Comply with applicable provisions of AWS D1.1 and AWS D1.3.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.
- B. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

PART 2 PRODUCTS

2.01 COLD-FORMED STEEL TRUSS SYSTEM

- A. Complete pre-engineered and shop-fabricated truss system of structural quality sheet steel per ASTM A653; sections specially configured for assembly as truss components; G60 protective zinc coating.
- B. Ultra-Span® by Aegis Metal Framing, a division of MiTek, as manufactured by Ciesco Truss & Panel, Harrisburg, PA or All-Span, Inc., Bridgeville, DE.
- C. TrusSteel Products, an ITW Company, as manufactured by Panel Systems, Inc., Lorton, VA or American Panel Tec, South Plainfield, NJ.
- D. Or equal.

2.02 FABRICATION

- A. Factory fabricate cold-formed steel trusses, square, true-to-line, and with connections securely fastened according to manufacturer's design.
 - 1. Fabricate truss assemblies in jig templates.
 - 2. Cut truss members by sawing, shearing, or plasma cutting.
 - 3. Fabricate truss members in one-piece lengths unless splice connections are indicated in manufacturer's design.
 - 4. Fasten cold-formed steel truss members by welding or screw fastening, or other methods as standard with fabricator. Wire tying of framing members is not permitted.

- a. Comply with AWS requirements and procedures for welding, appearance, quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to manufacturer's instructions with screws penetrating joined members by not less than three exposed screw threads.
- B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses.
- C. Fabrication Tolerances - Fabricate trusses to a maximum allowable tolerance from true-to-line of 1/8 inch in 10 feet. Fabricate steel trusses to a maximum out-of-square tolerance of 1/8 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine structure, substrates and installation conditions. Do not proceed with cold-formed steel truss installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 GENERAL

- A. Erection of trusses, including proper handling, safety precautions, temporary bracing, and other safeguards or procedures are the responsibility of the Contractor and Contractor's installer.
- B. Exercise care and provide erection bracing required to prevent toppling of trusses during erection.
- C. Provide isolation of galvanized framing against pressure-treated lumber, concrete, and masonry.
- D. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.
- E. Provide proper lifting equipment, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.
- F. Provide framing anchors as indicated by system design and erection drawings.
- G. Install roof framing and accessories plumb, square, true-to-line, and with connections securely fastened.
 - 1. Do not cut truss members without prior approval of truss engineer.

2. Fasten cold-formed steel roof framing by welding or screw fastening, as standard with fabricator.
 - a. Comply with AWS requirements and procedures for welding, appearance, quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to manufacturer's instructions with screws penetrating joined members by not less than three exposed screw threads.
 - c. Install roof framing in one-piece lengths, unless splice connections are indicated.
 - d. Provide temporary bracing and leave in place until trusses are permanently stabilized and braced, both horizontally and vertically.

H. Erection Tolerances

1. Install trusses to a maximum allowable tolerance from plumb, level, and true-to-line of 1/8 inch in 10 feet.
2. Space individual trusses no more than $\pm 1/8$ inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.03 INSTALLATION

- A. Space trusses at 24 inches on center.
- B. Do not alter, cut, or remove truss members or connections of truss members.
- C. Erect trusses without damaging truss members or connections.
- D. Anchor trusses securely at all bearing points.
- E. Install continuous bridging and permanent truss bracing per truss design requirements.
- F. Install necessary roof cross and horizontal diagonal bracing per design.

3.04 GALVANIZING REPAIR

- A. Repair damaged galvanized coating with galvanizing repair paint according to ASTM A780 and the manufacturer's instructions.

END OF SECTION

SECTION 05500

MISCELLANEOUS FABRICATIONS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Ferrous and non-ferrous metal and fiberglass components, including miscellaneous framing, structural and miscellaneous shapes, plates, anchor rods, bolts and accessories, etc.
- B. Shop-fabricated items including bollards, lintels, shelf angles, bearing plates, wall brackets, custom pipe supports, etc.
- C. Manufactured items including ladders, floor access hatches, etc.
 - 1. Access hatch conditions include new hatch in an existing framed opening (reusing existing hatch frame), new hatch and frame in a new opening, and new (hingeless) aluminum cover over a new or existing opening.

1.02. REFERENCES

AAMA	American Architectural Manufacturers Association
ANSI A14.3	Ladders - Fixed - Safety Requirements
ASTM A6	General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A36	Specification for Carbon Structural Steel
ASTM A48	Gray Iron Castings
ASTM A53	Specification for Pipe, Steel, Black and Hot-Dipped
ASTM A123	Zinc (Hot-Dip Galvanized) Coatings on Steel Products
ASTM A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A276	Specification for Stainless Steel Bars and Shapes
ASTM A307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A489	Carbon Steel Lifting Eyes
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A536	Ductile Iron Castings
ASTM A572	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A992	Specification for Structural Steel Shapes
ASTM B209	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B241	Aluminum-Alloy 6063 Seamless Pipe and Extruded Tube
ASTM B308	Aluminum-Alloy 6061-T6 Standard Structural Profiles

ASTM B632	Aluminum-Alloy Rolled Tread Plate
ASTM D4385	Classifying Visual Defects in Thermosetting Reinforced Plastic Pultruded Products
ASTM E84	Class 7, Fire Retardant Fiberglass Materials
ASTM F593	Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F1554	Anchor Bolts, Steel, 36, 55, and 105 ksi Yield Strength
ASTM F2329	Zinc Coating, Hot-Dip, Requirements for Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
AWS A2.4	Standard Symbols for Welding, Brazing, and Nondestructive Examination
AWS D1.1	Structural Welding Code - Steel
AWS D1.2	Structural Welding Code - Aluminum
AWS D1.3	Structural Welding Code - Sheet Steel
AWS D1.6	Structural Welding Code - Stainless Steel
OSHA 1910.27	Fixed Ladders
SSPC	The Society for Protective Coatings

1.03. SUBMITTALS

A. Shop Drawings

1. Include detailed fabrication drawings with Bill of Materials and finishes, erection drawings, and applicable details such that the Contractor does not need to reference the Contract Drawings.
2. Indicate profiles, sizes, connections, attachments, reinforcing, anchorage, size and type of welds, holes, fasteners, and accessories.
3. Shop drawings shall be submitted in sets of similar fabricated items. Large submittals, generally over 10 sheets, consisting of several different fabricated items will be returned to the Contractor unreviewed.
4. All resubmittals of shop drawings shall have all revisions/corrections clearly highlighted to the Engineer (e.g., labeled, clouded, etc.).

- B. Submit manufacturer's product data (i.e., catalog cuts) for floor access hatches, ladders, telescoping safety posts, and other manufactured items that include details of manufactured product with installation instructions.

1.04. COORDINATION

- A. Coordinate work with existing field conditions.
- B. Field verify all dimensions prior to submittal of shop drawings.
- C. Coordinate placement of concrete and grouting of masonry with installation of cast-in (embedded) items.

1.05. QUALIFICATIONS

- A. Weld procedures and welder personnel shall be AWS qualified. Keep procedures and certifications on file. Submit only when requested.

PART 2 PRODUCTS

2.01. MATERIALS

- A. “W”-Shaped Steel Beams - ASTM A992, Grade 50.
- B. “S”-Shaped Steel Beams - ASTM A36 or ASTM A992, Grade 50.
- C. “C”-Shaped or “MC”-Shaped Steel Channels - ASTM A36 or ASTM A572 Grade 50.
- D. Steel Angles and Plates - ASTM A36.
- E. Hollow Structural Sections (HSS)
 - 1. Rectangular and Square Sections - ASTM A500, Grade B, 46 ksi.
 - 2. Round Sections - ASTM A500, Grade B, 42 ksi.
- F. Aluminum Sections - ASTM B308, Alloy 6061-T6. Use Aluminum Association shapes.
- G. Aluminum Sheet and Plates - ASTM B209, Alloy 5052.
- H. Aluminum Checkered Floor Plate - ASTM B632, Alloy 6061-T6.
- I. Aluminum Rectangular Bars - ASTM B221, Alloy 6061-75.
- J. Stainless Steel Structural Shapes – ASTM A276, Type 316 or Type 316/316L, annealed.
- K. Stainless Steel Angles and Plates - ASTM A276, Type 316 or Type 316/316L.
- L. Pipe
 - 1. Steel - ASTM A53, Grade B.
 - 2. Aluminum Alloy - 6061-T6.
- M. Fiberglass Fabrications - All structural shapes shall be manufactured using the pultrusion process with a minimum glass content of 45 percent. Use extra corrosion-resistant vinyl ester resin material for all shapes and plates. All fiberglass resin shall contain an integral UV inhibitor and be produced with a resin-rich surface to protect against exposure and wear.
- N. Bolts - ASTM F593 stainless steel, Type 316; ASTM A325 carbon steel; galvanized (A325) bolts as a manufactured fastener assembly to comply with ASTM A153 or F2329; ASTM A489 steel lifting eyes.

All bolt accessories including nuts, washers, etc. shall be of the same material as the bolt. Dielectric separation (i.e., neoprene washers) shall be used when a fastener material may be reactive to the base material.

- O. Bolted Attachment to Concrete and Masonry – For structural connections, use stainless steel threaded rods with chemical adhesive anchor system as specified in Section 05505, Concrete and Masonry Anchors. (Expansion anchors are not allowed unless specifically requested by Contractor for a particular application and approved by Engineer.)
- P. Cast-In Anchor Rods (Bolts) – ASTM F1554 anchor rods galvanized to ASTM A153. Reference Section 05505, Concrete and Masonry Anchors.
- Q. Welding Filler Metals and Electrodes - AWS D1.1, D1.2, D1.3, and D1.6.
 - 1. For steel welding, filler metal shall conform to AWS 5.1 or 5.5 and E70xx SMAW electrodes shall be used.
 - 2. Required type(s) for other materials being welded.
- R. Touch-Up Primer for Galvanized Surfaces - Zinc-rich paint.

2.02. SHOP-FABRICATED ITEMS

- A. Bollards - 6-inch galvanized steel, Schedule 80 pipe; concrete filled (crowned cap); prime and finish paint unless a plastic sleeve is indicated on the Contract Drawings.
- B. Steel Shelf Angles (Galvanized)
 - 1. Provide hot-dip galvanized steel lintels as shown on Contract Drawings for support of masonry and veneer.
 - 2. Prime paint galvanized steel angles before installation; exposed surfaces to be finish painted.
- C. Steel Lintels (Galvanized)
 - 1. Provide hot-dip galvanized steel lintels as shown on Contract Drawings and where masonry lintels are not indicated for masonry openings larger than 16 inches for concrete block and 8 inches for brick. At doors, windows, HVAC accessories, access panels, and utility penetrations, extend only lintels supporting CMU 8 inches beyond opening (each side).
 - 2. Prime paint galvanized steel lintels before installation; exposed surfaces to be finish painted.
- D. Bearing plates with minimum two 5/8-inch diameter by 4 inch long welded studs to be cast in concrete or embedded in grout-filled masonry bond beams.
- E. Anchorage for miscellaneous metal items cast in concrete shall have, as a minimum, welded-on strap anchors 2 feet o.c., made from 1/4 inch thick x 1-inch wide x 6-inch long bar stock with each end bent 90 degrees.

F. Pipe Supports

1. Provide pipe supports constructed of structural shapes and materials as detailed on the Contract Drawings.
2. Entire pipe support assembly shall be hot-dip galvanized after fabrication, unless specifically indicated otherwise in the Contract Documents.

2.03. MANUFACTURED ITEMS

A. Floor Access Hatches

1. Exterior - Hatch shall consist of 1/4-inch aluminum checkered plate cover with watertight gasket seal, aluminum channel frame with drain coupling, backpainted, complete stainless steel hardware including slam lock with cover plug. Contractor to extend hatch drain to exterior or to sump as directed by Owner's representative.
 - a. For H20 load capacity, use standard size single- or double-leaf Bilco, Type J-AL H20 or JD-AL H20; EJ Group, Model DT HD-AOSG or DTD-HD-AOSG; Halliday Products, Series H1W or H2W; or equal.
 - b. Only at exterior hatches in surfaces located a minimum of 1 foot above grade or roadway, and not accessible to vehicles, are allowed to have a reduced 300 psf load capacity if not otherwise specified as an H20 hatch in the Contract Documents. Use standard size single- or double-leaf Bilco, Type J-AL or JD-AL; EJ Group, Model DT AOSG or DTD-AOSG; Halliday Products, Series W1R or W2R; or equal.
2. Interior - Hatch shall be rated for 300 psf loading and shall consist of 1/4-inch aluminum checkered plate cover with watertight gasket seal, aluminum angle frame, backpainted, complete stainless steel hardware including slam latch with flush lift handle.
 - a. Use standard size single- or double-leaf Bilco, Type K-AL or KD-AL; EJ Group, Model LEC-AOSG or LECD AOSG; Halliday Products, Series S1S or S2S; or equal.
 - b. Provide exterior H20 rated hatches for interior applications where H20 hatches are specified.
3. Floodtight – Use 1/4-inch aluminum checkered plate hatch with watertight gasket seal, backpainted, complete stainless steel hardware including standard slam lock with cover plug. Hatch must withstand and prevent leakage for a minimum of 10 feet of water pressure and shall set flush with top of concrete.

Use single-leaf Bilco, Type WT; U.S.F. Fabrications, Model W-APS; or equal.

4. Provide a hinged FRP or aluminum safety grate fall-through protection system at all floor access hatches. The safety grate shall not reduce the clear opening of the specified hatch size.

B. Aluminum Ladders

1. Ladders to conform in all respects to the requirements of OSHA 1910.27.
 2. 6061-T6 or 6063-T5 mill finish aluminum. All welds and sharp edges to be ground smooth.
 3. Rungs
 - a. Square or rectangular in profile with ridged or serrated non-slip top surface, capable of supporting a 300-lb. concentrated load at any point along the length of the rung without failure or permanent deformation.
 - b. Vertical spacing of rungs to be equal throughout the length of the ladder, from floor to top of roof slab or upper walking surface, and not to exceed 12 inches.
 - c. Centerline of rungs to be minimum 7 inches from wall (climbing surface) or obstruction opposite climber.
 4. Side Rails
 - a. Rectangular tube or channel in profile.
 - b. Supported by brackets at base and at maximum spacing of 48 inches o.c. along vertical length. Secure brackets with 5/8-inch diameter Type 316 stainless steel adhesive anchors, 4-inch minimum embedment.
 5. See Drawings for specific configurations.
- C. Provide stainless steel or aluminum telescoping safety post that automatically locks in the fully raised position at all ladders below access hatches. Use "Ladder UP" by Bilco, "Safety Post" or "Safety Extensions" by U.S.F. Fabrication, or equal.

2.04. FINISHES

- A. Prepare steel surfaces in accordance with SSPC SP 6.
- B. Shop prime paint steel items, not galvanized, and top coat after installation. Prime paint shall be compatible with paint (coating) system specified in Section 09900, Painting. Do not prime surfaces where field welding is required.
- C. Galvanized items shall be hot-dip galvanized in accordance with ASTM A123 or A153. Provide minimum 2.0 oz/sq.ft. galvanized coating.
- D. Unless noted otherwise, aluminum shall be mill finish.
- E. Aluminum in contact with concrete or masonry shall be backpainted with bituminous paint.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that field conditions are acceptable and are ready to receive work. Measurements and dimensions to be field verified.
- B. Beginning of installation means Contractor has verified and accepts existing conditions.

3.02. FABRICATION

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Welds shall be continuous unless noted otherwise. Grind down welds smooth to remove excess material.
- D. Exposed Mechanical Fastenings - Unobtrusively located, consistent with design of component.
- E. Supply components required for anchorage of fabrications.
- F. Fiberglass Fabrications - All cuts and drilled holes shall be sealed with vinyl ester resin to provide maximum corrosion resistance.

3.03. FABRICATION TOLERANCES

- A. Squareness - 1/8-inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces - 1/16-inch.
- C. Maximum Misalignment of Adjacent Members - 1/16-inch.
- D. Maximum Bow - 1/8-inch in 48 inches.
- E. Maximum Deviation From Plane - 1/16-inch in 48 inches.

3.04. INSTALLATION

- A. Allow for erection loads and provide sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- B. Install items plumb and level, accurately fitted, free from distortion or defects.
- C. Install manufactured items in accordance with manufacturer's instructions.
- D. Install and secure all cast-in (embedded) items prior to placement of concrete or grouting of masonry.
- E. Perform field welding in accordance with AWS.

- F. Fasten aluminum fabrications using Type 316 stainless steel bolts and accessories.
- G. All aluminum fabrications that will be in contact with concrete or masonry shall be back painted with a bituminous coating.
- H. Fasten galvanized steel fabrications using A325 galvanized bolts and accessories unless Type 316 stainless steel bolts and accessories are otherwise indicated in the Contract Documents.
- I. Fasten fiberglass fabrications using Type 316 stainless steel bolts and accessories.
- J. Carbon steel bolts shall only be used for painted carbon steel framing connections.
- K. Isolate dissimilar metals with dielectric and use appropriate fasteners.
- L. Obtain Engineer approval prior to site cutting or making adjustments not indicated on shop drawings.
- M. Prior to installation, aluminum surfaces in contact with concrete and/or masonry require backpainting.
- N. After erection, touch up paint welds, bolts, connection material, and abrasions.
- O. Top paint all exposed steel that is not galvanized, except for bollards, overhead door frames, shelf angles, and lintels.
- P. Touch-up all galvanized surfaces with zinc-rich paint.
- Q. Fiberglass Fabrications - All field cuts and drilled holes shall be sealed with vinyl ester resin as supplied by the manufacturer to provide maximum corrosion protection.

3.05. INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb - 1/4-inch.
- B. Maximum Offset From True Alignment - 1/4-inch.
- C. Maximum Out-of-Position - 1/4-inch.

END OF SECTION

SECTION 05505

CONCRETE AND MASONRY ANCHORS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Post-installed chemical adhesive anchor system for installing threaded rods (bolts) and reinforcing bar dowels into concrete and masonry. Both threaded rods (bolts) and dowels are referred to as anchors herein.
- B. Limited use of post-installed mechanical anchors in concrete and masonry.
- C. Cast-in anchors for attachment to concrete.
- D. Embedded anchors for attachment to masonry.

1.02. REFERENCES

ACI 355.1R	State-of-the-Art Report on Anchorage to Concrete
ASTM A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	Carbon Steel Bolts and Studs, 60 ksi Tensile Strength
ASTM A325	Structural Bolts, Heat Treated, 120/105 ksi Tensile Strength
ASTM A449	Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
ASTM A615	Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM E488	Strength of Anchors in Concrete and Masonry Elements
ASTM E1512	Testing Bond Performance of Bonded Anchors
ASTM F593	Stainless Steel Bolts, Hex Cap Screws, and Studs
ASTM F594	Stainless Steel Nuts
ASTM F1554	Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ICC AC 308	Acceptance Criteria for Post-installed Adhesive Anchors in Concrete Elements

1.03. SUBMITTALS

- A. Submit catalog cuts for chemical adhesive grout product to be used for anchoring threaded rods (bolts) and dowels into concrete and/or masonry. Catalog cuts (do not submit whole catalogs) shall be clearly marked to include:
 - 1. Tension and shear strength design values for each anchor size used on this project.
 - 2. Manufacturer's installation instructions.
 - 3. Allowable temperature range for proper anchor installation.

- B. Submit the ICC-ES Evaluation Service Report (ESR) for proposed adhesive anchor system if not a named product below in Part 2.
- C. Submit data on adhesive anchor threaded rods to be used, including materials, sizes, lengths, etc.
- D. Submit catalog cuts on mechanical, expansion-type anchor bolts and drop-ins, and clarification on the requested use.

1.04. QUALITY ASSURANCE

- A. If the Contractor is not experienced in installing chemical adhesive anchors, or as requested by the Engineer, a representative from the adhesive anchor manufacturer shall be present at start of project to instruct the Contractor on how to properly install the adhesive anchors.
- B. Upon request, 5 percent of all adhesive anchors shall be proof-loaded by an independent testing laboratory. The location(s) shall be determined by Engineer. These tests shall be paid for by the Contractor and the results shall be submitted to the Engineer.
- C. Adhesive anchor systems shall have a current ICC-ES Evaluation Service Report that states recommended design capacities. Reports shall be performed in accordance with ICC AC 308 and ASTM E1512.

1.05. COORDINATION

- A. Coordinate the placement of anchor bolts with approved items and fabrications.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Adhesive anchor system shall be a high-strength, premeasured, two-part, self-mixing, cartridge-type epoxy adhesive such as “HIT HY 200” by Hilti, Inc.; “Epcon S7” by ITW Red Head, “Set-XP” by Simpson Strong-Tie Company, Inc.; or equal.
 - 1. Provided adhesive anchor system shall meet or exceed the minimum loading capacities of these specified products.
 - 2. Where anchors or dowels are to be drilled and embedded into hollow (ungrouted) masonry, provide adhesive anchor system specifically designed for masonry applications such as “HIT HY 270” by Hilti, Inc. Provide sleeve (screen tube) system for this specific application.
- B. Mechanical Anchors – Mechanical (expansion-type) anchors are not allowed unless specifically requested (for a special application) by the Contractor and approved by Engineer in writing. Refer to limitations of use stated in Part 3.
 - 1. If approved, they shall be hot-dip galvanized or stainless steel expansion-type bolts or drop-in anchors.
 - 2. Anchors shall be rated for a minimum of twice the required load capacity.

- C. Cast-in Anchor Rods (Bolts) – ASTM F1554 anchor rods galvanized to ASTM A153. Use minimum 3/4-inch diameter headed rods (with welded nut) 18 inches long, or as shown on the Contract Drawings.
- D. Stainless Steel Threaded Rods – ASTM A593, Type 316.
- E. Stainless Steel Nuts – ASTM A594, Type 316.
- F. Reinforcing Steel Dowels – ASTM A615, Grade 60 deformed bar.
- G. All threaded rods and anchor bolt accessories, including nuts, washers, etc. shall be of the same material as the rods/bolts.

PART 3 EXECUTION

3.01. INSTALLATION OF ADHESIVE ANCHOR SYSTEMS

- A. All bolted connections to concrete and masonry shall utilize an adhesive anchor system as specified above.
- B. Threaded stainless steel rods shall be used for all anchor bolt applications, unless noted otherwise in the Contract Documents.
- C. Provide templates or other means to accurately locate anchors.
- D. Drilled holes shall be cleaned out and shall be free of dust and trapped water.
- E. Masonry wall (cores) shall be filled with grout where anchors are to be installed. In existing construction where masonry cores are not (and cannot be) grout filled, manufacturer's masonry screen tube shall be used with anchor installation.
- F. Install adhesive anchors in accordance with manufacturer's instructions and recommendations.
- G. Anchor bolts installed into concrete and/or masonry shall not be closer than 6 inches o.c. unless indicated otherwise.
- H. All structural members bolted to concrete and/or masonry shall be made with a minimum of two 5/8-inch diameter anchors at each connection.
- I. Anchor bolts and dowels shall be clean and free of coatings or other contaminants that would impair bonding to the chemical adhesive.
- J. Threaded rods shall be long enough to project through the entire depth of nut and shall be cut off at 1/2 inch beyond the top of nut.
- K. Anchor bolts and dowels shall not be installed in concrete less than seven days old, or older if recommended by the manufacturer.
- L. Adhesive anchors shall be fully cured prior to applying load on anchor.

3.02. INSTALLATION OF CAST-IN AND EMBEDDED ANCHORS

- A. All cast-in and embedded anchors shall be hot-dip galvanized unless noted otherwise in the Contract Documents.
- B. Provide templates or other means to accurately place anchors.
- C. Anchors shall be secured in place to not allow displacement during placement of concrete or masonry grout.
- D. Concrete or masonry grout shall be thoroughly vibrated around the anchors for proper bonding of the anchors.
- E. Anchor rods shall be long enough to project through the entire depth of nut and shall be cut off at 1/2 inch beyond the top of nut.
- F. Concrete or masonry shall be at full 28-day compressive strength prior to applying load on anchor.

3.03. INSTALLATION OF MECHANICAL ANCHORS

- A. Mechanical (expansion-type) anchors are only allowed for overhead (ceiling) applications where thru-bolting cannot be performed. Mechanical anchors are not allowed for any other use unless specifically requested (for a special application) by the Contractor and approved by Engineer in writing.
- B. Mechanical anchors shall support static tension loads not exceeding 200 lbs. per anchor.
- C. Drilled holes shall be cleaned out and free of dust.
- D. Anchors shall be fully seated prior to pretension. Pretension in accordance with manufacturer's instructions.
- E. Engineer may request any/all these mechanical anchors to be proof-loaded.

END OF SECTION

SECTION 05510

METAL STAIRS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Framing for metal stairs, use structural shapes.
- B. Tread types for metal stairs are open grate or made using specialty manufactured extruded planks as indicated herein.
- C. Closed risers using bent plate made of the same material as the stair treads.
- D. Landings that are part of the stair system, use the same material to match tread design.

1.02. DESIGN REQUIREMENTS

- A. Complete design of stairs as partially detailed on the Contract Drawings and as specified herein.
- B. Provide stair treads and landing surfaces per Section 05531, Grating and Floor Plank.
- C. Fabricate stair railings per Section 05520, Railing Systems.

1.03. SUBMITTALS

- A. Shop Drawings - Include complete fabrication details and erection plans, including connections, attachments, reinforcing, anchorage, size and type of fasteners, accessories, and all dimensions. Photocopies of Contract Drawings, in whole or in part, are not acceptable.
- B. Indicate welded connections using standard AWS welding symbols.
- C. Submit product data for manufactured items, with items of intended use highlighted or otherwise indicated.
- D. Stair treads and landing surfaces shall be submitted under Section 05531, Grating and Floor Plank, and must be approved prior to approval of stair shop drawings.

1.04. COORDINATION

- A. Field verify all measurements and elevations prior to submittal of shop drawings.
- B. Obtain approval on stair treads from Engineer prior to submitting stair shop drawings.

PART 2 PRODUCTS

2.01. MATERIALS

- A. For stair (and landing) framing, reference Section 05500, Miscellaneous Fabrications.
 - 1. Fabricate stair stringers and landing frames that are a continuation of the stair stringers using channels as indicated on the Contract Drawings.
 - 2. Fabricate tread and landing surface supports with angles or channels as indicated on the Contract Drawings.
- B. For stair treads and landing surfaces, reference Section 05531, Grating and Floor Plank.
 - 1. Use grated stair treads and landing surfaces for exterior stairs unless indicated otherwise on the Contract Drawings.
 - 2. Use solid surface plank stair treads and extruded planks at landing surfaces for interior stairs unless indicated otherwise on the Contract Drawings.
- C. Solid risers are custom fabricated using bent metal plate attached to the treads as indicated on Contract Drawings.
- D. For guardrails and handrails (railings), reference Section 05520, Railing Systems.
- E. Fasteners for aluminum fabrications shall be Type 316 stainless steel.

2.02. FABRICATION

- A. Reference Section 05500, Miscellaneous Fabrications, for standard fabrication requirements.
- B. Fit and shop assemble in largest practical sections, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Seal jointed metal pieces by continuous welds.
- E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Supply components required for anchorage of fabrications. Use Type 316 stainless steel connectors on aluminum.
- G. Clean, straight, sharply-defined profiles with smooth surfaces of uniform color, free from defects. Where possible, weld on unexposed side in order to prevent pitting or discoloration. Finish to be free from scratches, "leave-off marks," or other surface blemishes.
- H. Provide all hangers, framing clips, anchors, etc., required for complete installation.

2.03. FINISHES

- A. Aluminum surfaces to be mill finish.
- B. Backpaint aluminum surfaces to be in contact with concrete or masonry with bituminous paint.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work. Measurements and dimensions to be field verified.
- B. Beginning of installation means Contractor has verified and accepts existing conditions.

3.02. PREPARATION

- A. Supply items required to be cast into concrete or embedded in masonry.

3.03. INSTALLATION

- A. Install items as detailed on approved shop drawings and in accordance with specified requirements. All components shall be installed plumb and level, accurately fitted and rigid, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. All bolts and anchors to concrete or masonry shall be stainless steel, adhesive type per Section 05505, Concrete and Masonry Anchors.
- D. Allow for erection loads and provide sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Wherever possible, weld rather than bolt. Field weld components indicated on approved shop drawings.

Perform welding in accordance with AWS Standard. Grind welds smooth and flush.

- F. Field bolt to match shop bolting. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings, as applicable.

Bolt threads shall not project beyond nuts more than one thread or shall be cut off and ground smooth. Nuts shall have the thread upset to prevent nut from loosening after erection.

- G. Exposed work shall be neatly finished. Joints shall be made true and tight. Mechanically fasten joints butted tight.

- H. Obtain Engineer approval prior to site cutting or making adjustments not indicated on approved shop drawings.

3.04. INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb - 1/4-inch.
- B. Maximum Offset From True Alignment - 1/4-inch.
- C. Maximum Variation of Riser Height - 3/8 inch (in any flight of stairs).
- D. Maximum Variation of Tread Depth - 3/8 inch (in any flight of stairs).

END OF SECTION

SECTION 05520

RAILING SYSTEMS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Aluminum guardrails and handrails (both referred to as railing).
- B. Aluminum railings to be assembled using non-welded components with internal splice insert system that produces a consistent outside diameter/dimension of fittings and railing.
- C. Aluminum toeboards to be installed on guardrails where toeboard has been removed or is not installed.

1.02. REFERENCES

- A. AAMA - American Architectural Manufacturers Association
- B. ASTM B221 - Aluminum Alloy 6063 Extruded Bars, Rods, Wire, Shapes, and Tubes
- C. ASTM B241 - Aluminum Alloy 6063 Seamless Pipe and Extruded Tube

1.03. DESIGN REQUIREMENTS

- A. Railing assembly, wall rails, and attachments to resist the maximum force from a concentrated lateral load of 200 lbs. or a uniform load of 50 lbs. per linear foot at any point or direction without damage or permanent set. Vertical posts must withstand concentrated load applied at the top of 200 lbs. (with a 4-foot maximum aluminum post spacing).

1.04. DELIVERY, STORAGE AND HANDLING

- A. Protect from corrosion, deformation and other types of damage. Store items in an enclosed area free from contact with soil and weather. Replace damaged items with new materials.

1.05. SUBMITTALS

- A. Shop Drawings - Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, accessories, materials, and finishes.
- B. Provide detailed shop fabrication and erection drawings to include connections, fittings, complete bill of materials, finishes, etc.
- C. Product Data - Provide single-page catalog cut sheets on base mounts, side mounts, wall brackets, internal splice connectors, and all manufactured items.

1.06. COORDINATION

- A. Field verify all dimensions before fabrication.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. Aluminum Products

1. Julius Blum and Company - Connectorail system with #7571 floor flange or #757/758 fascia flange (aluminum).
2. Moultrie Mfg. Company - Wesrail II system with #W32612 base or #WIISMBEXT side-mount bracket (aluminum).
3. Tubular Specialties Mfr., Inc. - Adaptarail system with #662 floor flange (aluminum).
4. Or equal. (Substitutes are allowed provided that the submitted manufacturer can demonstrate satisfaction of load requirements as stated above.)

2.02. ALUMINUM RAILING SYSTEM

- A. Rails - 1-1/2-inch nominal diameter, extruded aluminum pipe per ASTM B241.
 - 1. Use Schedule 40 pipe for interior applications.
 - 2. Use Schedule 80 pipe for exterior applications.
- B. Posts - 1-1/2-inch nominal diameter, extruded aluminum Schedule 80 per ASTM B241.
- C. Fittings - Elbows, T shapes, wall brackets, escutcheons, etc.; machined aluminum.
- D. Welded components require aluminum filler Alloy 5356 to improve color match after anodizing treatment.
- E. Mounting - Pre-manufactured, heavy duty, four-bolt floor flange (with internal reinforcement post) or four-bolt side-mount fixture.
- F. Splice Connectors - Concealed spigot machined aluminum.
- G. Exposed Fasteners - Flush countersunk stainless steel screws or bolts; consistent with design of railing.
- H. Vertical posts to be spaced at 4 feet o.c. maximum.
- I. Toeboards shall be manufacturer's standard aluminum shape, OSHA compliant.

2.03. FABRICATION

- A. Fabricate aluminum railing with compatible connectors, fittings and fasteners. Joints to be mechanical without welding.
- B. Provide floor mounts and/or side mounts, wall brackets, terminals, flanges and caps, etc., as indicated and required for complete installation. Details of railing systems to be as indicated on Contract Drawings.

- C. Fit and shop assemble components in largest practical sizes, for delivery to site.
 - 1. Fabricate components with joints tightly fitted and secured.
 - 2. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate related components of same material and finish as fabrication.
- E. Accurately form components to suit stairs, landings, and building structure. Terminate stair handrails as indicated on Contract Drawings.
- F. All exterior railings shall be protected from entrapped water and from temperature-induced stresses. The railing manufacturer shall provide weep holes and expansion joints.
- G. Toeboards shall be provided at all railings, except at top of curbs and walls (extended more than 4 inches above walking surfaces) and where the platform or walkway framing extends a minimum of 4 inches above the walking surface. Toeboards shall be fastened at each post. Provide expansion joints at 20-foot maximum intervals with 1/4-inch opening.
- H. Aluminum toeboards to be installed on guardrails where toeboard has been removed or is not installed.

2.04. FINISHES

- A. Aluminum railing systems shall receive a clear anodized finish meeting AAMA, Class I.
- B. Aluminum toeboards shall be mill finish.
- C. Backpaint aluminum surfaces in contact with concrete or masonry with bituminous paint.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means Contractor has verified and accepts existing conditions.

3.02. PREPARATION

- A. Supply items required to be cast into concrete or embedded in masonry.

3.03. DISSIMILAR MATERIALS

- A. Make connections using stainless steel fasteners and isolate with dielectric as needed.
- B. Aluminum to be in contact with concrete or masonry shall be backpainted with bituminous paint.

3.04. INSTALLATION

- A. Install railings in accordance with approved shop drawings. Manufactured components shall be installed in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. All anchoring and attachments to concrete or masonry shall use chemical adhesive anchors.
- D. Provide and install anchors, plates or angles required for connecting railings to structure.
- E. Conceal bolts and screws whenever possible.

3.05. INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb - 1/4-inch.
- B. Maximum Offset From True Alignment - 1/4-inch.

END OF SECTION

SECTION 05531

GRATING AND FLOOR PLANK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Aluminum floor grating.
- B. Extruded aluminum planks.
- C. Aluminum stair treads.
- D. Fiberglass reinforced plastic (FRP) floor grating.
- E. Perimeter frames and supports.

1.02. REFERENCES

- A. AWS A2.4 - Standard Symbols for Welding
- B. AWS D1.1 - Welding Code - Steel
- C. AWS D1.2 - Welding Code - Aluminum
- D. NAAMM MBG 531 - Metal Bar Grating Manual
- E. NAAMM MBG 533 - Welding Specifications for Fabrication of Steel, Aluminum, and Stainless Steel Bar Grating
- F. ASTM A48 - Gray Iron Castings
- G. ANSI/ASCE/ACMA FGM-2003 - The Fiberglass Grating Manual
- H. ASTM E84 - Class 7, Fire Retardant Fiberglass Materials
- I. ASTM B221- Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- J. ASTM B308 - Aluminum Alloy 6061-T6 Standard Structural Shapes

1.03. PERFORMANCE REQUIREMENTS

- A. On Drawings where depth of grating or plank is not indicated or where no loading requirements are specified, the grating or plank shall be designed for the following:
 - 1. At grated areas in floors – Uniform live load of 250 lbs/sq.ft.
 - 2. At Platforms and Walkways - Uniform live load of 60 lbs/sq.ft. and a concentrated load of 300 lbs.

3. At Stairs and Stair Landings - Uniform live load of 100 lb/sq.ft. and a concentrated load of 300 lbs.

B. Maximum Allowable Deflection Under Live Load

1. Aluminum Grating - 1/240 of span.
2. Extruded Planks - 1/240 of span.
3. Fiberglass Grating - 1/4 inch.

C. Clear space between grating bearing bars shall be 1 inch or less.

1.04. SUBMITTALS

A. Shop Drawings

1. Indicate details of gratings, stair treads, extruded planks, aluminum plank covers, component supports, fasteners, openings, perimeter construction details, and tolerances.
2. Provide detailed fabrication and erection drawings showing panel layouts indicating all panel sizes and weights.

B. Provide catalog cut of selected grating details along with manufacturer's span and deflection tables.

C. Provide catalog cut of selected extruded plank details along with manufacturer's span and deflection tables.

D. Provide a fabricated sample for aluminum grating and aluminum plank cover as follows:

1. Aluminum Grating Sample - 6-inch square to illustrate style, surface finish, welding, edge banding, and workmanship.
2. Edge Support Frame - 6-inch by 6-inch corner section to show workmanship, anchors, welding, and finish. Attach grating sample to frame sample with proposed grating anchor.
3. Aluminum Plank Cover Sample - Three extruded aluminum plank sections (12 inches long) banded together as a panel with edge banding and lifting handle at the ends to illustrate style, surface finish, welding, edge banding, and workmanship.

1.05. QUALIFICATIONS

A. Weld procedures and welder personnel must be AWS qualified. Maintain procedures and certificates on file.

1.06. COORDINATION

A. Field verify all dimensions prior to fabrication.

- B. Coordinate embedment of frames with concrete placement. Post-installation of embedded frames is not allowed.
- C. Coordinate placement of panels with platform/walkway framing.
- D. Coordinate placement of frames and panels with required openings and penetrations for piping and conduit, instrumentation controls, mechanical equipment, etc.
- E. Coordinate size and location of removable sections with approved equipment and where shown on the Contract Drawings.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Aluminum Grating
 - 1. IKG Industries - Product: Aluminum 3/16-inch wide rectangular bar, Type BS (P-19-4) with serrated surface. IKG Industries extruded frame.
 - 2. Ohio Gratings, Inc. - Product: Aluminum 3/16-inch wide rectangular bar Type 19-SG-4 with serrated surface. Ohio Gratings extruded angle frame.
 - 3. Or equal.
- B. (Heavy) Aluminum Grating
 - 1. IKG Industries - Product: Aluminum 3/16-inch wide rectangular bar, Type DS with serrated surface. IKG Industries extruded frame.
 - 2. Ohio Gratings, Inc. - Product: Aluminum 3/16-inch wide rectangular bar Type 15-SG-4 with serrated surface. Ohio Gratings extruded angle frame.
 - 3. Or equal.
- C. Pultruded Fiberglass Grating
 - 1. Pultruded grating composed of I-shaped bearing bars utilizing a vinyl ester resin.
 - 2. Grating shall consist of integrally applied anti-skid grit surface.
 - 3. All grating shall be molded in yellow.
 - 4. Use Strongwell "DURADEK," Fibergrate Composite Structures "Safe-T-Span," or equal.
- D. Molded Fiberglass Grating (Mesh)
 - 1. IKG Industries - Product: Fiberglass square mesh, molded Type V, non-slip platform grating with rectangular mesh, molded stair tread.

2. Fibergrate Composite Structures - Product: Fiberglass square mesh, molded, non-slip platform grating with Fibertred rectangular mesh stair treads. Use Fibergrate “Vi-Corr” resin system. Fibergrate EZ angle frame.
 3. Or equal.
- E. Extruded Aluminum Planks - Solid surface, extruded aluminum planks, specialty manufactured, with non-slip surface.
1. Ohio Gratings, Inc. - Product: AlPlank.
 2. McNichols Company - Product: HD RS Series.
- F. Grated Stair Treads - Use same type, finish, and bar spacing as floor grating. Provide with cast aluminum abrasive (non-slip) nosing on aluminum treads. Use manufacturer’s standard non-slip nosing on fiberglass treads.
- G. Extruded Plank Stair Treads - Provide solid surface, extruded aluminum planks with non-slip surface and built-in nosing, 1-1/2-inch minimum depth by 12 inches wide with end caps for attachment to stringers.

2.02. MATERIALS

- A. Aluminum Grating, Stair Treads, Frames, Support Angles, and Banding - ASTM B221 alloy 6061 T6 or 6063 T6; mill finish. Stair treads to have abrasive (non-slip) nosings.
- B. Extruded Aluminum Planks - ASTM B221 alloy 6063-T6, mill finish.
- C. Fiberglass Grating - Shall be made with a compression molded process using an extra corrosion-resistant vinyl ester resin system.
1. Manufacturer’s standard color shall be impregnated throughout material.
 2. Fiberglass grating shall have an integral non-slip surface molded onto the wear surface.
- D. Fiberglass support angles and frames cast into concrete shall be made with a pultrusion process using an extra corrosion-resistant vinyl ester resin system.
- E. Fiberglass adjustable pedestal supports for mesh grating shall be made with a pultrusion process using an extra corrosion-resistant vinyl ester resin system.

2.03. DISSIMILAR MATERIALS

- A. Where dissimilar metals contact, provide approved dielectric of laminated plastic.
- B. Backpaint aluminum support frames and angles in contact with concrete or masonry using a bituminous paint.

2.04. ACCESSORIES

- A. Fasteners - All fasteners, including hold-down clips, to be Type 316 stainless steel for fiberglass grating and for aluminum grating.

2.05. FABRICATION

- A. Grating panels (80 pounds maximum weight per panel) shall have continuous edge banding along the cut ends of the bearing bars. The cross bars shall be cut back flush to face of bearing bars and ground smooth to remove sharp edges.
- B. Extruded aluminum plank panels used along walkways and platforms shall be banded together in panels between 24 and 36 inches wide with edge banding along both ends. These panels shall be constructed in the shop by the plank fabricator.
- C. Aluminum plate covers (panels) to be fabricated as above specified extruded aluminum plank panels with custom lift handles at each end (reference details on the Contract Drawings).
- D. Edge banding shall be installed flush with top and bottom of grating/panel and surrounding construction. In exception to NAAMM MBG 533 (2.1 Welding Standards), welds to be within center 75 percent of depth of bearing bar, not extending to top or bottom edge of grating/panel.
- E. Grating and extruded plank installations require fabricated frames embedded into concrete unless indicated otherwise on the Contract Drawings. When embedment into concrete is not possible, support angles (of same material) shall be attached to the concrete walls with 5/8-inch diameter Type 316 stainless steel adhesive anchors.
 - 1. Aluminum Embedded Frames - Shop fabricated, miter cut and welded corners. Frames to be four-sided fabrications where practical, of 1/4-inch thick aluminum sections, as indicated. Welds to be ground smooth.
 - 2. Fiberglass Frames - Field miter cut to fit four sides of opening and cast into concrete.
 - 3. Cast Iron Embedded Frames - Install embedded cast iron frames along sides of trench drains.
- F. For all grated areas, the grating shall be cut such that all non-bearing cross bars are in alignment when viewed perpendicular to the span of the grating.
- G. Grating shall be fabricated in panels that can be easily unfastened and removed. Provide smaller removable panels where special access to equipment is required.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that opening sizes and dimensional tolerances are acceptable.
- B. Ensure that supports, anchors, edge bands and frames are correctly positioned.

3.02. INSTALLATION

- A. Items to be installed in conformance with specifications and details shown on approved shop drawings with all parts in alignment, true and rigid.
- B. Install components in accordance with manufacturer's instructions.
- C. Place frames in correct position, plumb and level.
- D. Mechanically cut aluminum and fiberglass components.
- E. All grating bearing bars shall be banded and completely supported and not allowed to deflect by hanging off cross bars.
- F. Anchor non-removable grating panels by bolting through saddle clips at four corners to prevent movement or rocking. Wedges or shimming devices will not be permitted.
- G. Anchor extruded plank panels with Type 316 stainless steel fasteners at four corners to prevent movement or rocking. Wedges or shimming devices will not be permitted.
- H. Brackets, supports, and other details not shown on the Contract Drawings, but necessary for the work, shall be furnished by the Contractor.
- I. Install fiberglass adjustable pedestal supports below fiberglass mesh grating at the spacings required to achieve the required design loading of the grating. However, spacing of pedestal supports shall not exceed 4 feet 0 inches in each direction.
- J. Install removable sections where indicated on the Contract Drawings.
- K. Install grating and planks around piping, conduits, and other openings and penetrations.
 - 1. Completed installation shall not leave gaps larger than 1 inch around perimeter of penetrations and more than 2 inches in front of gates.
 - 2. Openings and penetrations greater than 3 inches shall be edge banded.

3.03. INSTALLATION TOLERANCES

- A. Conform to NAAMM MBG 531 and FGM-2003 where applicable and as indicated below.
 - 1. Maximum Space Between Adjacent Sections - 1/8 inch.
 - 2. Maximum Variation From Top Surface Plane of Adjacent Sections - +1/8 inch.

END OF SECTION

SECTION 06112

FRAMING AND SHEATHING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Structural and non-structural framing and dimension lumber.
- B. Engineered lumber products.
- C. Fire retardant treated materials.
- D. Preservative treatment of wood.

1.02. REFERENCES

- A. AITC - American Institute of Timber Construction.
- B. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- C. ASTM C1186-91 - Specification for Flat Non-Asbestos Fiber Cement Sheets.
- D. ASTM C120 - Test Methods of Flexure Testing of Slate (Breaking Load, Modulus of Rupture, Modulus of Elasticity)
- E. ASTM C170 - Test Method for Compressive Strength of Dimension Stone.
- F. ASTM C209 - Test Methods of Cellulosic Fiber Insulating Board.
- G. ASTM D732 - Test Method for Shear Strength of Plastics by Punch Tool.
- H. APA - American Plywood Association.
- I. AWPA (American-Wood Preservers' Association) U1 - Use Category System.
- J. AWPA - Standards Used for Quality Control of Micronized Copper Quaternary Treatments: Analytical Standards A2-06, A3-05, A9-01, A11-93, A17-03, A18-05, A21-00, A36-04, A37-05.
- K. ICC Evaluation Services, Inc. - ICC-ES Report and ESP 1980.
- L. NeLMA - Northeastern Lumber Manufacturers Association.
- M. NPA - National Particleboard Association.
- N. SPIB - Southern Pine Inspection Bureau.

1.03. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Provide product data, including dimensions, configuration, base and finish materials, and performance characteristics for items listed below. Include installation or use instructions where applicable.
 - 1. Wood preservative materials.

1.04. QUALITY ASSURANCE

- A. Perform work in accordance with the following agencies:
 - 1. Lumber Grading Agency - Certified by ALSC.
 - 2. Plywood Grading Agency - Certified by APA.
 - 3. Preservative-Treated Lumber and Plywood - Certified by AWWA.
- B. In lieu of grade stamping exposed to view lumber and plywood, submit manufacturer's certificate under provisions of Section 01400, Quality Control, that products meet or exceed specified requirements.
- C. Obtain treated wood products from a single source.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600, Materials and Equipment.
- B. Protect site framing lumber from warping or other distortion by stacking horizontally, allowing air circulation. Position with spacers to allow ventilation.
- C. Do not store products in building until wet trade materials are dry.

1.06. SIZES AND SURFACING

- A. PS 20 for dressed sizes of yard and structural lumber, surfaced four sides. Size references are nominal sizes; actual sizes shall be within manufacturing tolerances of standard under which product is produced.

1.07. MOISTURE CONTENT

- A. Moisture content at delivery.
 - 1. Framing Lumber 2 Inches and Less in Thickness - 19 percent maximum.
 - 2. Boards - 19 percent maximum.
 - 3. Framing Lumber Over 2 Inches Thick - 25 percent maximum.

4. Materials Other Than Lumber - Moisture content shall be in accordance with standard under which product is produced.

PART 2 PRODUCTS

2.01. LUMBER PRODUCTS

A. Sawn Lumber

1. Lumber Grading Rules – NeLMA Standard Grading Rules for Northeastern Lumber, and SPIB Standard Grading Rules for Southern Pine.
2. Structural and Non-Structural Light Framing and Studding - Spruce-Pine-Fir No. 1; minimum Fb for single use up to 12-inch wide: 875 psi; E = 1,400,000 psi; 19 percent maximum moisture content.
3. Blocking and Miscellaneous Framing - Spruce-Pine-Fir No. 2; minimum Fb for single use up to 12-inch wide: 875 psi; E = 1,400,000 psi; 19 percent maximum moisture content.
4. Preservative-Treated Lumber – Southern Pine No. 2; minimum Fb for single use up to 6-inch wide: 1,250 psi; E = 1,600,000 psi; 19 percent maximum moisture content.

2.02. ACCESSORIES AND ROUGH HARDWARE

A. Fasteners and Anchors

1. Fasteners - Stainless steel for securing wood treated with CBA and ACQ formulations, coated or galvanized steel for securing wood treated with MCQ formulations, and unfinished steel elsewhere.
2. Rough hardware shall be the type and size necessary for project requirements. Sizes, types, and spacing of fastenings of manufactured building materials to be as recommended by product manufacturer. Rough hardware exposed to the weather, embedded in or in contact with exterior masonry, concrete walls, or slabs shall be stainless steel. Nails and fastenings for fire-retardant treated lumber and woodwork exposed to the weather shall be copper alloy.

2.03. SHEATHING MATERIALS

- A. Plywood Roof Sheathing – Tongue and groove 23/32-inch Sturd-I-Floor APA Rated Sheathing Structural I, span rating 24OC; Exposure 1.

B. FRP-Faced Plywood

1. Applied to wood furring where shown on Room Finish Schedule.
2. 5/8-inch thick C-C plugged exterior plywood with a minimum 0.09-inch thick FRP facing layer. Gel-coated and embossed facing layer to have a Class A flame spread rating. Basis of design: Kemlite Fire-X Glasbord with Surfaseal or equal.

2.04. PRESERVATIVE TREATMENT

A. Pressure Treatment

1. Preservative treatment chemical shall be:
 - a. Wolman E as manufactured by Arch Wood Protection, Inc., of Smyrna, GA.
 - b. ACQ as manufactured by Chemical Specialties, Inc., of Charlotte, NC.
 - c. Micronized Copper and Quaternary (MCQ) Treatment, "Micropro" by Osmose, Inc., of Griffin, GA.
 - d. Or equal as approved by Engineer.
 2. Preservative treatment shall not contain arsenic or chromium.
 3. Retention of preservative chemical shall be as follows:
 - a. For CBA or ACQ formulations, retention shall be as required to meet AWWA Standard U1 for the appropriate Use Category as defined therein, but in no case shall retention be less than 0.20 pounds per cubic foot for CBA formulations or 0.25 for ACQ formulations.
 - b. For MCQ formulations, retention shall meet accepted standards from ICC Evaluation Services, Inc., ESP 1980.
 4. Lumber shall be kiln-dried after preservative treatment.
- B. Cuts made in lumber after treatment shall be coated according to the recommendations of the preservative treatment manufacturer.
- C. All lumber to be installed in contact with concrete or masonry; or to be used to frame or block roof openings or penetrations; or to be installed as sub-fascia boards, shall be pressure treated with preservative. This includes wood plates secured to the tops of masonry walls.

2.05. ENGINEERED LUMBER PRODUCTS

- A. Laminated Strand Lumber (LSL) - Engineered lumber made with strands of various species and strands classifications in accordance with the standards approved by APA. Minimum Modulus of Elasticity 1.55E.

2.06. FIRE RETARDANT TREATED EXTERIOR LUMBER

- A. Pressure treat fire retardant lumber to meet the follow: ASTM E-84 Standard Test Method for Surface Burning Characteristics of Building Materials. NFPA 255 - Method of Test Surface Burning Characteristics of Building Materials is essentially the same as ASTM E-84. UBC Standard 8-1 Test Method for Surface-Burning Characteristics of Building Materials is based on Standard Test Method ASTM E-84.

B. Manufacturers

1. PYRO-GUARD - Hoover Treated Wood Products, Inc.
2. Dricaon – Lonza Wood Protection.
3. Or equal.

PART 3 EXECUTION

3.01. INSTALLATION - GENERAL

- A. Closely fit rough carpentry, set accurately to required lines and levels, and secure in place in rigid and substantial manner. Do not splice framing members between bearing points. Set joists, rafters, and purlins with their crown edge up. Frame members for the passage of pipes, conduits, and ducts. Do not cut or bore structural members for the passage of ducts or pipes without Engineer's approval. Reinforce all members damaged by such cutting or boring by means of specially formed and approved sheet metal or bar steel shapes, or remove and provide new, as approved. Provide as necessary for proper completion of work all framing members not indicated or specified. Spikes, nails, and bolts shall be drawn up tight. Timber connections and fastenings shall conform to NFPA National Design Specification for Wood Construction.
- B. Set structural members level and plumb, in correct position.
- C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Place horizontal members flat, crown side up.
- E. Construct load bearing framing members full length without splices.
- F. Lumber in contact with concrete or masonry shall be preservative treated by treatment with an approved preservative treatment system per paragraph 2.03.A.
- G. Tolerances
 1. Framing Members - 1/4 inch from true position, maximum.

3.02. MISCELLANEOUS

- A. Wood Blocking - Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.
- B. Temporary Closures - Provide with hinged doors and padlocks and install during construction at exterior doorways and other ground level openings that are not otherwise closed. Cover windows and other unprotected openings with polyethylene or other approved material, stretched on wood frames. Provide dustproof barrier partitions to isolate areas as directed.

3.03. APPLICATION

- A. Cutting of wood members that becomes necessary for the installation of mechanical equipment, such as ductwork, fans, piping, electrical equipment, etc., is the responsibility of the Contractor. Fit woodwork around equipment, etc., as required.
- B. Joints shall be fitted tightly to avoid opening later. Keep work plumb, true and in place, free from stains and tool marks. All pieces shall be as long as possible and splices shall be made carefully. Blind nail when possible.

END OF SECTION

SECTION 07190

VAPOR AND AIR BARRIERS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install vapor retarders, air barriers, and required accessories in accordance with the Contract Documents including, but not limited to, the following:
 - 1. Sheet Vapor Retarder – For installation beneath concrete floor slabs.
 - a. Seam tape and other accessories for use with sheet vapor retarders.
 - 2. Air and Vapor Barrier – Fluid-applied elastomeric air and vapor barrier for installation to the exterior of concrete masonry unit walls; designated “AVB” on Drawings.
 - a. System includes all detail tapes, flashings, sealants, control joint treatment and adhesives required to provide:
 - 1) Continuity of the air and vapor barrier across the masonry surface and connections to adjacent construction.
 - 2) Weather protection including positive drainage from the masonry wall cavity.
 - b. AVB, in conjunction with insulation, and veneer masonry, must comply with the regulatory requirements stated in Article 1.05 of this section.
 - 3. Cold-Applied, Single-Component Waterproofing – For exterior insulated slabs with heated spaces below
 - 4. Cold-Applied, Single-Component Waterproofing – For exterior below-grade foundation walls.

1.02. REFERENCES

- A. Sealant, Waterproofing, and Restoration Institute (SWRI) – Sealants: The Professionals Guide.
- B. ASTM D882 – Tensile Properties of Thin Plastic Sheeting
- C. ASTM D4833 – Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
- D. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials

- E. ASTM E96 – Standard Test Method for Water Vapor Transmission of Materials
- F. ASTM E1643 – Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
- G. ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
- H. ASTM E2357 – Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- I. ICC Evaluation Service (ICC-ES) – Evaluation Reports
- J. NFPA 259 – Standard Test Method for Potential Heat of Building Materials
- K. NFPA 285 – Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.04. PERFORMANCE REQUIREMENTS

- A. Materials of this section shall provide continuity of the building enclosure vapor or air barrier as indicated in the Contract Documents.
- B. Where foam plastic insulation forms part of an exterior wall assembly, such assembly must comply with the regulatory requirements stated in Article 1.05.

1.05. REGULATORY REQUIREMENTS

- A. Completed exterior wall assemblies, including insulation, vapor barrier, air barrier, weather barrier, flashing, sealants, and adhesives are to match that of an assembly that has been tested and met the requirements of NFPA 285, or match that of an assembly described in an ICC-ES Evaluation Report that certifies the assembly as meeting IBC Section 2603.5

1.06. SUBMITTALS

- A. Provide in accordance with Section 01300, Submittals, and as supplemented herein. Submittals shall include, but not be limited to, the following:
- B. Product Data
 - 1) For all sheet and fluid-applied materials, provide manufacturer's technical literature indicating composition, tensile strength, permeability, and other relevant characteristics.
 - 2) For all vapor retarder, vapor barrier or air barrier materials, provide manufacturer's technical literature describing all accessory materials required for a complete installation including, but not limited to, flashings, detail membranes or tapes, edge sealants, and adhesives.

- 3) Provide detailed installation instructions indicating conditions necessary for fluid-applied membranes and associated accessories to function as an effective barrier system, integrated with the wall, window and door configurations specific to this project.
- 4) Submit a letter from the manufacturer of compliance with regulatory requirements.
- C. Submit manufacturer's samples of sheet products.
- D. Shop Drawings - Provide standard details, special details, and assistance to Contractor for use by suppliers of products referenced in sections listed in Article 1.02 in preparing detailed coordination drawings.
- E. Where foam plastic insulation forms part of an exterior wall assembly: submit proof of compliance with the regulatory requirements of Article 1.05.

1.07. QUALITY ASSURANCE

- A. Where relevant, perform work in accordance with SWRI Sealant and Caulking Guide Specification requirements for materials and installation

1.08. MOCK-UP

- A. Provide mock-up of vapor and air barrier materials under the following provisions:
 - 1. Construct as a part of a typical exterior wall panel as shown on Contract Drawings, and directed under provisions of Section 04300, Unit Masonry System, incorporating window or louver opening with frame and sill installed, insulation, building corner condition, illustrating materials interface and seals.
 - 2. Locate where directed
 - 3. Mock-up may not remain as part of the work.

1.09. DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in manufacturer's original, unopened containers with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean dry area in accordance with manufacturer's instructions.

1.10. ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during, and after installation.

1.11. SEQUENCING

- A. Sequence work to permit installation of materials in conjunction with other materials and seals.

1.12 COORDINATION

- A. Coordinate the work of this section with all sections referencing this section or referenced by this section.

PART 2 PRODUCTS

2.01. SYSTEMS

- A. 10 Mil Sheet Vapor Retarder – For installation beneath concrete floor slabs. To meet or exceed the requirements of ASTM E1745 for Class A. To include all accessories and components of a complete system by a single manufacturer, or with all components approved in writing by the sheet manufacturer.
 - 1. Griffolyn® Division of Reef Industries, Inc., Houston, TX
 - 2. Raven Industries, Sioux Falls, SD
 - 3. STEGO Industries, LLC, San Clemente, CA
- B. Air and Vapor Barrier (AVB) – Fluid-applied elastomeric air and vapor barrier for installation to the exterior of concrete masonry unit walls and to the top surface of precast concrete ceiling planks, designated “AVB” on Drawings. To include all accessories and components of a complete system by a single manufacturer, or with all components approved in writing by the membrane manufacturer and a letter from the manufacturer of compliance with regulatory requirements.
 - 1. Performance
 - a. Volatile organic compounds less than 52 µg/L.
 - b. Water Vapor Permeance per ASTM E96.B less than one Perm.
 - c. Air Leakage 0.0075 CFM/ft² or less per ASTM E2357.
 - d. Flame Spread Index less than 25, and Smoke Generation 200 or less per ASTM E84.
 - 2. Manufacturers
 - a. Carlisle Coating & Waterproofing, Inc.
 - b. W. R. Meadows Inc.
 - c. Tremco Commercial Sealants & Waterproofing, Inc.
- C. Cold –Applied, Single-Component Waterproofing - For exterior insulated slabs with heated spaces below. To meet or exceed the requirements of ASTM C836. To include all accessories and components of a complete system by a single manufacturer, or with all components approved in writing by the manufacturer.

1. Hydralastic 836 - W. R. Meadows Company
 2. Henry CM100 – Henry Company
 3. ConSeal CS-1800 Waterproofing Membrane – Concrete Sealants Inc.
- D. Cold –Applied, Single-Component Waterproofing - For exterior below grade foundation walls. To meet or exceed the requirements of ASTM C836. To include all accessories and components of a complete system by a single manufacturer, or with all components approved in writing by the manufacturer.
1. Hydralastic 836 - W. R. Meadows Company
 2. Henry CM100 – Henry Company
 3. ConSeal CS-1800 Waterproofing Membrane – Concrete Sealants Inc.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work.

3.02. PREPARATION

- A. Remove objects which might impale/puncture sheet material.
- B. Remove loose or foreign material which might impair adhesion of seam and flashing tapes
- C. Prime surfaces where directed by manufacturer's instructions

3.03. INSTALLATION OF SHEET MATERIALS

- A. Install sheet materials in accordance with manufacturer's instructions; tape all seams
- B. Lap sheet materials and seal with tape. Position lap seal over firm bearing.
- C. Cut sheet materials tight to pipes and other slab penetrations. Seal to penetrating objects with tape. At pipe penetrations, seal with prefabricated pipe boots
- D. Repair holes or punctures with self-adhesive tape.

3.04. INSTALLATION OF FLUID-APPLIED SYSTEMS

- A. Install fluid-applied systems in accordance with manufacturer's instructions.
- B. Use self-adhesive flashing or detail material, in combination with compatible sealants and adhesives, to provide continuity between barrier membrane and window, door and louver frames.

- C. Connect barrier membrane to flashings to provide continuous weather protection and positive drainage in wall assemblies.
- D. Provide flexible and air-tight connections between membrane surfaces on either side of substrate movement joints.

3.05. PROTECTION OF FINISHED WORK

- A. Do not permit adjacent or subsequent work to damage work of this section.

END OF SECTION

SECTION 07212

BOARD INSULATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Board insulation at slabs-on-grade and perimeter foundation walls.
- B. Board insulation installed in unit masonry system cavity walls.

1.02. REFERENCES

ASTM D1187	Standard Specification for Asphalt Base Emulsions for Use as Protective Coatings for Metal
ASTM D1227	Standard Specifications for Emulsified Asphalt Used as a Protective Coating for Roofing
ASTM C578	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

1.03. PERFORMANCE REQUIREMENTS

- A. Materials of this section shall provide continuity of thermal barrier at building enclosure elements.

1.04. SUBMITTALS

- A. Submit under provisions of the Division 1 contract requirements.
- B. Product Data - Provide manufacturer's data on product characteristics, performance criteria, limitations, and installation methods.
- C. Submit a letter from the manufacturer of compliance with NFPA 284 compliance for above-grade walls

1.05. ENVIRONMENTAL REQUIREMENTS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.06. COORDINATION

- A. Coordinate work under provisions of the Division 1 contract requirements.
- B. Coordinate the work with Section 04300, Unit Masonry System, for installation of vapor retarder and mastic adhesive.

PART 2 PRODUCTS

2.01. MANUFACTURERS - INSULATION MATERIALS

- A. Dow Chemical Company.
- B. Owens Corning.
- C. Johns-Manville.
- D. Substitutions - Under provisions of the Division 1 contract requirements.

2.02. INSULATION MATERIALS

- A. Polystyrene Insulation - ASTM C578 Type IV or Type VI; extruded cellular type, conforming to the following minimum criteria:

Thermal Resistance	R of 5.0 per inch
Thickness	3-inch for cavity walls and 3-inch for foundation wall
Board Size	24 x 96 inch at foundation walls; 16 x 96 inch at cavity walls
Compressive Strength	Minimum 25 psi for cavity wall installation (Type IV); minimum 40 psi for below-grade installation (Type VI)
Water Absorption	In accordance with ASTM C272 0.3 percent by volume maximum (both types)
Water Vapor Permeance	1.1 maximum in accordance with ASTM E96 (both types)
Edges	Square edges

2.03. ADHESIVE

- A. Adhesive - Fibered asphalt emulsion mastic conforming to ASTM D1187 Type I and ASTM D1227 Type II, Class 1. Adhesive to be compatibility with AVB above-grade, and compatibility with waterproofing below grade
 - 1. Karnak Corporation 920AF, Clark, NJ.
 - 2. Sonneborn Hydrocide 700, Shakopee, MN.
 - 3. Dow Corning Corporation, Auburn, MI.
 - 4. Approved equal as per insulation manufacturer recommendations.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify site conditions under provisions of the Division 1 contract requirements.

- B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.
- C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede adhesive bond.

3.02. INSTALLATION

A. Foundation Perimeter

- 1. Apply insulation boards to exterior foundation walls as shown on construction drawings.
- 2. Adhere insulation to wall by applying 4-inch diameter spots of adhesive to walls 16 inches on center both ways. Press insulation firmly into adhesive immediately after placement of adhesive.

B. Cavity Walls

- 1. Verify that masonry veneer ties are in place and properly spaced before applying vapor retarder/adhesive.
- 2. Trowel on a full and continuous coating of vapor retarder/adhesive to the outside face of the inner wythe of the cavity wall. Apply at a coverage of 4 to 6 gallons per 100 square feet.
- 3. Once the continuous coating of vapor retarder and mastic adhesive has cured, apply 4-inch diameter spots of adhesive to walls 16 inches on center both ways. Press insulation firmly into adhesive immediately after placement of adhesive.
- 4. Fit insulation tightly around masonry veneer ties and other interruptions in the wall surface.

3.03. PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of the Division 1 contract requirements.
- B. Do not permit work to be damaged prior to covering insulation.

END OF SECTION

SECTION 07213

BATT AND BLANKET INSULATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Batt insulation in ceiling as indicated.

1.02. REFERENCES

- A. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

1.03. PERFORMANCE REQUIREMENTS

- A. Materials of this section shall provide continuity of thermal barrier at building enclosure elements.

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Product Data - Provide manufacturer's data on product characteristics, performance criteria, limitations and insulation value.

1.05. COORDINATION

- A. Coordinate work under provisions of Section 01039, Coordination and Meetings.
- B. Coordinate the work of Section 07190, Vapor and Air Barriers, for installation of vapor and air barrier seals.
 - 1. Installation of self-adhesive vapor barrier sheet at exterior side of precast concrete plank.
 - 2. Installation of air barrier at exterior side of framed wall systems.

PART 2 PRODUCTS

2.01. MANUFACTURERS - INSULATION MATERIALS

- A. Owens-Corning, Toledo, OH.
- B. Certainteed, Valley Forge, PA.
- C. Manville, Denver, CO.
- D. Or equal.

2.02. MATERIALS

- A. Batt Insulation - For framed wall and ceiling construction, ASTM C665; Type I unfaced, as shown on the Drawings.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify site conditions under provisions of Section 01039, Coordination and Meetings.
- B. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.
- C. Verify that vapor and air barriers, where shown on drawings, are in place and properly sealed at seams and penetrations.

3.02. INSTALLATION

- A. Friction fit insulation in accordance with insulation manufacturer's instructions.
- B. Install in wall, roof, and ceiling spaces with no gaps or voids, where indicated.
- C. Coordinate lay-in of insulation with other affected trades and after ceiling and roof have been installed.
- D. Trim insulation neatly to fit spaces.
- E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

END OF SECTION

SECTION 07410

STANDING-SEAM METAL ROOF PANELS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. This Section includes
 - 1. Factory formed metal roof panels: Standing-seam, hidden fastener, non-insulated.
 - 2. Finish must conform to the "Metal Construction Association Certified Premium Painted™" Standard.

1.03. PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B. Wind-Uplift Resistance: Capable of resisting design negative uplift pressures based upon maximum wind speeds of 73 psf. Provide clips, fasteners, and clip spacing of type indicated and with capability to sustain, without failure, a load equal to 2 times the design negative uplift pressure.
- C. Wind-Uplift Resistance: Capable of producing sheet metal roofing assemblies that comply with UL 580 for Class 90 wind-uplift resistance. Other performance test shall include ASTM E1592 Static Air Pressure Test for Roof Coverings.

1.04. SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory, including each type of underlayment product indicated:
 - 1. Concealed fastener, standing seam metal roof panels and accessories.
 - 2. Underlayment.
- B. Shop Drawings: Show layouts of sheet metal roofing, including plans, elevations, and keyed references to termination points. All fastening patterns shall be clearly designated to meet the specified wind speed requirements.

1. Include details for forming, joining, and securing sheet metal roofing, including pattern of seams, termination points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and accessory items.
- C. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:
 1. Roof panels and attachments.
 2. Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, snow guards, and items mounted on roof curbs.
- D. Samples: For each exposed finish.
- E. Field quality control inspection reports, to be submitted for warranty program level, if applicable.
- F. Product test reports. Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:
- G. UL 580, ASTM E 283, ASTM E 331, ASTM E 330, Field Tested, ASTM E 1592, UL 2218, ASTM E 84 Flame Spread Rating, Paint Performance Tests.
- H. Insulation and Vapor Retarders: Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

1.06. QUALITY ASSURANCE

- A. Installer Qualifications: Installer of sheet metal roofing for a minimum of 10 years.
- B. Roll-Formed Sheet Metal Roofing Fabricator Qualifications: Minimum of 10 years factory forming experience.
- C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- D. Source Limitations: Obtain each type of metal roof panels through one source from a single manufacturer.
- E. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual and manufacturer's installation guidelines.
- F. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance that comply with ASTM E 108 in accordance with UL790.
- G. Pre-installation Conference: Conduct conference at project location with building owner, architect, installing contractor, general contractor and sheet metal roofing manufacturer a minimum of 10 days prior to start of work. All details shall be reviewed including; underlayments, substrates, fastening patterns, scheduling, trim and flashing components, accessories such as fasteners and sealants.

- H. Construction Inspection: Manufacturer shall conduct onsite inspection and formal written report to architect and owner at the following intervals: 50 percent sheet metal roofing installation completion, and final inspection upon completion of roof system. Related to warranty - standard level.

1.07. DELIVERY, STORAGE & HANDLING

- A. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.
- B. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.
- C. Do not allow storage of other materials or allow staging of other work on installed metal panel system.
- D. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment for damage and for completion of the consignment.

1.08. PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.

1.09. SCHEDULING

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in Division 7 Section "Roof Accessories."
- B. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks, purlins and rafters, parapets, walls, and other adjoining work to provide a leakproof, secure, and non-corrosive installation.

1.10. WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish Warranty Period: 30 years from date of Substantial Completion.
- B. Special Installer's Warranty: Specified form in which Roofing Installer agrees to repair or replace components of custom-fabricated sheet metal roofing that fail in materials or workmanship within 5 years from date of Substantial Completion.

- C. Special Weathertight Warranty: Manufacturer's Standard warranty in which manufacturer agrees to repair or replace roof panel assemblies that fail to remain weathertight within the specified warranty period.

- 1. Product Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Manufacturer's Qualifications:
All panels are to be factory formed and packaged per job requirements.
- B. Manufacturer shall have a minimum of 10 years' experience in the factory fabrication of metal wall panels. Specification is based upon the products of ATAS International, Inc.
- C. Manufacturer:
 - 1. Atas International
 - 2. MBCI, Inc.
 - 3. Firestone, Inc.

2.02. CONCEALED-FASTENER, STANDING SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation. Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together with approved seaming equipment.
 - 1. Basis-of-Design Product: ATAS International, Inc.; Field-Lok™; FLM125 or a comparable product.
 - 2. Manufacturer:
 - a. ATAS International, Inc.
 - 3. Material: 22 gauge metallic coated steel
 - a. Texture: Smooth

- b. Pan Coverage: 12-1/2"
- c. Seam Height: 1-1/2"
- d. KYNAR 5000® PDVF or HYLAR 5000® Finish
- e. Standard or Premium color to be chosen later

2.03. UNDERLAYMENT

- A. Felt: minimum 30 pound or high strength synthetic material conforming to ASTM D 226
- B. A slip sheet is required when utilizing a clip fastened system that rest directly on the concrete deck.

2.04. MISCELLANEOUS MATERIAL

- A. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Manufacturer shall provide or authorize all fasteners utilized with the sheet metal roofing system.
 - 1. Exposed Fasteners: Heads matching color of sheet metal roofing by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or screws spaced to resist wind uplift loads.
- B. Sealing Tape: Pressure-sensitive, 100 percent solid polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape.
- C. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to produce joints in sheet metal roofing that will remain weathertight.
- D. Expansion-Joint Sealant: For hooked-type expansion joints, which must be free to move, provide non-setting, non-hardening, non-migrating, heavy-bodied polyisobutylene sealant.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15 mil dry film thickness per coat.

2.05. ACCESSORIES

- A. Sheet Metal Roofing Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of sheet metal roofing, unless otherwise indicated. All trim and flashing components shall be supplied in a minimum of 12'-0" lengths and shall conform to manufacturer's standard part dimensions and details.

1. 26 ga. SS clip base w/26 ga. SS stem designed to withstand negative-load requirements.
 2. Closures: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or pre-molded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 3. Sealants as recommended by manufacturer.
 4. Fasteners as recommended by manufacturer.
- B. Flashing and Trim: Formed from matching materials as sheet metal roof panel in gauges noted. Provide flashing and trim in heavier gauge materials as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent sheet metal roofing.
- C. Snow Guards: SnoBar by Action Manufacturing or equal
1. MATERIALS:
 - a. Non-penetrating Clamps: 12 Ga. one-piece stainless steel clamps with 2 "cup tipped" stainless steel set screws used at every roof seam.
 - b. Bars: 16 Ga. Galvanized Steel Bar. Plastic end caps to be installed in each end of bar.

2.06. EQUIPMENT

- A. Manufacturer must maintain quality control and maintenance procedures of all equipment. Verification of quality control procedures must be validated by a 3rd party entity.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ATAS International, Inc.

2.07. FABRICATION

- A. General: Fabricate sheet metal roofing and components to comply with details shown, manufacturers installation details and recommendations in SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual that apply to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the manufacturer's location to the greatest extent possible.

- B. General: Fabricate sheet metal roofing panels to comply with details shown and sheet metal roofing manufacturer's written instructions.
- C. Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.
 - 1. Fold and cleat eaves as required by manufacturer to insure weathertightness and wind uplift resistance.
 - 2. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown and as required for leak proof construction and wind uplift resistance.
- D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.
- E. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before manufacturer fabrication.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
 - 3. For the record, prepare written report for the General Contractor, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. PREPARATION

- A. Lay out and examine substrate before installation of sheet metal roofing. Space fasteners as required to resist design uplift, but not more than 24 inches o.c.
- B. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

3.03. UNDERLAYMENT INSTALLATION

- A. Felt Underlayment; Install felt underlayment and building-paper slip sheet, or high strength synthetic material conforming to ASTM D 226 on roof sheathing under metal roof panels, unless otherwise recommended by metal roof panel manufacturer. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under metal roof panels. Apply at locations indicated on Drawings, in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.04. INSTALLATION, GENERAL

- A. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
 - 1. Field cutting of sheet metal roofing by torch is not permitted.
 - 2. Rigidly fasten ridge end of sheet metal roofing and allow for positive panel attachment as per manufacturer's recommendations. All flashing details shall accommodate thermal movement.
 - 3. Provide metal closures at peaks, ridge, gable and hip caps.
 - 4. Flash and seal sheet metal roofing with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 - 5. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition.
 - 6. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.
- B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar metals.

1. Separate sheet metal roofing from bituminous coating where roofing will contact wood, ferrous metal, or cementitious construction. Interlock and overlap shingles and stagger end joints from shingles above and below according to shingle manufacturer's written instructions.
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

3.05. ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual. Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.06. CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as sheet metal roofing is installed. On completion of sheet metal roofing installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

3.07. FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.

END OF SECTION

SECTION 07466

FIBER-CEMENT LAP SIDING AND TRIM

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Vertical siding.
- B. Perforated soffit panels.
- C. Fascia boards and trim boards.
- D. Accessories and trim.

1.02. REFERENCES

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- B. ASTM C1185 - Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards; 1999.
- C. ASTM C1186 - Standard Specification for Flat Non-Asbestos Fiber Cement Sheets; 1999.
- D. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 1998.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 1999.
- F. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials; 1995.
- G. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 1999.
- H. ASTM E228 - Standard Test Method for Linear Thermal Expansion of Solid Materials With a Vitreous Silica Dilatometer; 1995.
- I. ASTM G26 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials; 1996.

1.03. SUBMITTALS

- A. Make submittals under provisions of Section 01300, Submittals.
- B. Product Data - Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.

3. Installation methods, including nailing patterns.
 4. Applicable model code authority evaluation report (ICBO, BOCA, CCMC, etc.).
 5. Product data shall provide verification that product meets model code requirements and material properties per paragraph 2.02.A.
- C. Siding manufacturer's installation requirements for siding, accessories, and trim.
 - D. Maintenance and periodic inspection recommendations.
 - E. Warranty – Provide sample manufacturer's warranty indicating warranty period meeting requirements of Article 1.07.
- 1.04. QUALITY ASSURANCE
- A. Installer Qualifications - Provide installer with not less than three years of experience with products similar to those specified.
- 1.05. DELIVERY, STORAGE, AND HANDLING
- A. Store products off the ground, on a flat surface, and under a roof or separate waterproof covering.
- 1.06. WARRANTY
- A. Warranty on clapboard siding, not less than 50 years.
 - B. Warranty on fascia and trim boards, not less than 10 years.
 - C. Warranty on vented soffit panels, not less than 25 years.
 - D. Register manufacturer's warranty, made out in Owner's name, with copy to Owner.

PART 2 PRODUCTS

2.01. MANUFACTURER

- A. CertainTeed Corporation, Siding Products Group, Pennsylvania.
- B. James Hardie, Inc.
- C. Or equal.

2.02. PANELS

- A. Horizontal Siding – Prefinished siding, textured finish.
 1. Thickness - 5/16 inch (8 mm), nominal.
 2. Length - 12 feet (3657 mm), nominal.

3. Finish - Factory applied solid color to be selected.
- B. Soffit - Fiber-cement soffit, ventilated.
 1. Thickness - 1/4 inch (6 mm), nominal.
 2. Style - Smooth texture, 12 inches (305 mm) wide.
 3. Finish - Factory applied solid color to be selected.

2.03. ACCESSORIES

- A. Trim – Prefinished fiber-cement trim boards.
 1. Size
 - a. Thickness – 3/4 inch.
 - b. Width – As shown on Drawings.
 - 1) 3-1/2 inch.
 - 2) 5-1/2 inch.
 - 3) 7-1/4 inch.
 - 4) 11-1/4 inch.
 - c. Length - 12 feet or maximum available length.
- B. Provide the following trim:
 1. Starter strip for lap siding.
 2. Fascia Board – Configure as shown on Drawings.
 3. Trim board.
- C. Sealant – As recommended by siding manufacturer.
- D. Sheet Metal Flashing - Minimum .032-inch aluminum sheet.
- E. Nails - Length as required to penetrate minimum 1-1/4 inch (32 mm) into solid backing; hot-dipped galvanized or stainless steel.
- F. Building Paper - Bituminous paper.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Prior to commencing installation, verify governing dimensions of building and condition of substrate.
- B. Notify Engineer of unsatisfactory preparation before proceeding.

3.02. PREPARATION

- A. Examine, clean, and repair as necessary any substrate conditions that would be detrimental to proper installation.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.03. INSTALLATION

- A. Install in accordance with manufacturer's instructions and Drawing details.
 - 1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 - 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 - 3. Use trim details indicated on Drawings.
 - 4. Touch up all field cut edges before installing.
 - 5. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood, Wood-Composite Sheathing and Gypsum Sheathing with Glass Mat Facers - Fasten siding through sheathing into studs.
- C. Over Steel Studs - Minimum 20 gauge steel, 3-5/8 inch (92 mm) C-studs. Use 1-5/8-inch (41 mm) long, #8-18 x 3/8 inch HD self-tapping, corrosion-resistant ribbed bugle head screws. Attach siding at each stud insuring that at least three screw threads penetrate the studs.
- D. Allow space between both ends of siding panels that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.
- E. Joints in Horizontal Siding - Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- F. Install sheet metal flashing above door and window casings and horizontal trim in field of siding.
- G. Do not install siding less than 6 inches (150 mm) from surface of ground nor closer than 1 inch (25 mm) to roofs and other surfaces where water may collect.

- H. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.

3.04. CLEANING

- A. At completion of work, remove debris caused by siding installation from project site.
- B. Touch up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07630

GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Pre-coated aluminum gutters and downspouts.

1.02. REFERENCES

- A. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate.
- B. SMACN - Architectural Sheet Metal Manual.
- C. AAMA 2605 - Voluntary Specifications, Performance Requirements, and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

1.03. SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Shop Drawings - Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- C. Product Data - Provide material data on prefabricated components. Provide manufacturer's extended color range charts.

1.04. DELIVERY, STORAGE, AND HANDLING

- A. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.05. COORDINATION

- A. Coordinate work under provisions of section.
- B. Coordinate the work with downspout discharge pipe inlet.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Hickman - Product: Commercial grade gutters (G66) and downspouts (DS66).
- B. MM Systems - Product: Standard gutter and downspout.

- C. Or equal approved by Engineer under provisions of Section 010010.

2.02. MATERIALS

- A. Aluminum Sheet - ASTM B209, aluminum alloy, .040-inch thick; plain finish, shop pre coated with Kynar 500 coating of color per Exterior Color and Finish Schedule on Drawing A-1.

2.03. COMPONENTS

- A. Gutters - SMACNA square-style profile.
- B. Downspouts - SMACNA square profile.
- C. Accessories - Profiled to suit gutters and downspouts.

2.04. ACCESSORIES

- A. Anchorage Devices - Type recommended by manufacturer.
- B. Gutter Supports - Brackets and straps; type recommended by manufacturer.
- C. Downspout Supports - Brackets and straps; type recommended by manufacturer.
- D. Fasteners - Stainless steel with soft neoprene washers.
- E. Protective Back Coating - FS TT C 494, bituminous.

2.05. FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; solder seal watertight.

2.06. FINISHES

- A. Superior Performance Organic Coatings
 - 1. Comply with requirements of AAMA 2605.
 - 2. Color per Exterior Color and Finish Schedule on Drawing A-1.
- B. Apply bituminous protective backing on surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that surfaces are ready to receive work.

3.02. INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/8 inch per foot minimum.
- D. Seal metal joints watertight.

END OF SECTION

SECTION 07840

PENETRATION FIRESTOPPING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install firestop systems consisting of a material, or combination of materials, installed to retain the integrity of fire resistance rated construction by maintaining an effective barrier against the spread of flame, smoke and/or hot gases through penetrations, blank openings, construction joints, fire-resistive joints, and perimeter openings in or adjacent to fire-rated barriers in accordance with the requirements of the Building Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire resistance rated floor and roof assemblies requiring protected openings, including both empty openings and openings containing penetrants.
 - 2. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.
 - 3. Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the barrier.
 - 4. Joints between fire resistance rated assemblies.
 - 5. Perimeter gaps between rated floors/roofs and an exterior (rated and non-rated) wall assembly.

1.02. REFERENCES

- A. American Society For Testing and Materials Standards (ASTM)
 - 1. ASTM E84 - Standard Test Method For Surface Burning Characteristics of Building Materials
 - 2. ASTM E119 - Methods of Fire Tests of Building Construction and Materials
 - 3. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
 - 4. ASTM E814 - Standard Test Method For Fire Tests of Through-Penetration Firestops
 - 5. ASTM E1399 - Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Width
 - 6. ASTM E1966 - Test Method For Resistance of Building Joint Systems

7. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Fire Stops
 8. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus
 9. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers
- B. Underwriters Laboratories Inc. (UL)
1. UL 263 - Fire Tests of Building Construction and Materials
 2. UL 723 - Surface Burning Characteristics of Building Materials
 3. UL 1479 - Fire Tests of Through-Penetration Fire Stops
 4. UL 2079 - Tests for Fire Resistance of Building Joint Systems
- C. UL Fire Resistance Directory - Volume 2
1. Through-Penetration Firestop Devices (XHJI)
 2. Fire Resistive Ratings (BXUV)
 3. Through-Penetration Firestop Systems (XHEZ)
 4. Fill, Void, or Cavity Material (XHHW)
 5. Perimeter Barrier (Fire Containment) System (XHDG)
 6. Forming Materials (XHKU)
 7. Curtain Wall Insulation (XHGU)
- D. UL Building Materials Directory
1. Omega Point Laboratories (OPL) - Directory of Listed Building Products, Materials & Assemblies, Volume II
 2. UL Qualified Firestop Contractor Program
- E. Warnock Hersey (WH) - Certification and Listings Directory
- F. NFPA - NFPA 101: Life Safety Code
- G. NFPA 285, "Tests for Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multi-Story Test Apparatus."
- H. Current Building Code of New York State and referenced standards.

1.03. DEFINITIONS

- A. Firestopping - The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating of that wall or floor.
- B. System - The use of a specific firestop material or combination of materials around a specific penetrant(s) or into a specific joint in conjunction with a specific wall and/or floor construction type.
- C. Barrier - Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- D. Through-penetration - Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- E. Membrane-penetration - Any penetration in a fire-rated wall that breaches only one side of the barrier.
- F. Fire-Resistive Joint - Any gap, joint, or opening, whether static or dynamic, between two fire-rated barriers including where the top of a wall meets a floor; wall edge to wall edge configurations; floor edge to floor edge configurations; floor edge to wall configurations.
- G. Perimeter Barrier - Any gap, joint, or opening, whether static or dynamic, between a fire-rated floor assembly and a non-rated exterior wall assembly.
- H. Engineering Judgment (EJ) - A firestopping assembly proposed for conditions where a tested and listed firestopping system does not exist.

1.04. PERFORMANCE REQUIREMENTS

- A. Penetrations - Provide and install through-penetration firestop systems that are produced to resist the spread of fire, passage of smoke and other gases according to requirements indicated, to restore the original fire-resistance rating of barrier penetrated.
 - 1. Provide and install complete penetration firestopping systems that have been tested and approved by nationally accepted testing agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
 - 2. F-Rated Systems - Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E814 or UL 1479, but not less than 1 hour or the fire resistance rating of the barrier being penetrated.
 - 3. T-Rated Systems - Provide through-penetration firestop systems with T ratings indicated, as well as F-ratings, as determined per ASTM E814 or UL 1479, where required by the Building Code.
 - 4. L-Rated Systems - Provide through-penetration firestop systems with L ratings in addition to F and T ratings, as determined per UL 1479, where required by the Building Code.

5. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems (W-rated systems) as determined per UL 1479, where indicated.
 6. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of piping insulation.
- B. Fire-Resistive Joints - Provide joint systems with fire resistance assembly ratings indicated, as determined by UL 2079 (ASTM E1399 and E1966), but not less than the fire resistance rating of the construction in which the joint occurs. Firestopping assemblies must be capable of withstanding anticipated movements for the installed field conditions.
1. For firestopping assemblies exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 2. For floor penetrations exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
- C. Building Perimeter Barrier (Fire Containment) Systems - Provide interior perimeter joint systems with fire resistance ratings indicated as determined per ASTM E2307, but not less than the fire resistance rating of the floor construction.
1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, ponding water or other forms of moisture characteristic during and after construction.
 2. Provide sealants sufficiently flexible to accommodate movement such as thermal expansion, inter-story differential building sway and other normal building movement without damage to the seal.
 3. Provide perimeter fire containment systems subjected to an air leakage test conducted in accordance with Standard, ANSI/UL2079 with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.
- D. Firestopping products shall have flame spread ratings less than 25 and smoke-developed ratings less than 450, as determined per ASTM E84.
1. Where there is no specific third-party tested and classified firestop system available for a particular firestop configuration/condition, the firestopping contractor shall obtain from the firestopping material manufacturer an EJ or Equivalent Fire Resistance Rated Assembly (EFRRA) to be submitted to the approving authority and authority having jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines.

1.05. SUBMITTALS

- A. Provide in accordance with Section 01300, Submittals, and as supplemented herein. Submittals shall include, but not be limited to, the following:

1. Product Data - For each type of firestopping and/or barrier system product selected. Certify that firestopping materials are asbestos free and contain volatile organic compounds within limits of the local jurisdiction and are non-toxic to building occupants.
2. Design Listings - Submit system design listings, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestop configuration.
3. Where there is no specific third party tested and classified firestop system available for a particular configuration, the firestopping contractor shall obtain from the firestopping material manufacturer an EJ or EFRRA for submittal.
4. Qualification Data - For firms and persons specified in Article 1.07 to demonstrate their capabilities and experience. Submit document from manufacturer wherein manufacturer recognizes the installer as qualified.

1.06. QUALITY ASSURANCE

- A. Provide firestopping and/or perimeter barrier system design listings from UL or OPL in accordance with the appropriate ASTM Standard(s) per Article 1.05.
- B. Contractor Qualifications - An acceptable installer shall meet any two of the following requirements:
 1. Licensed by state or local authority where applicable.
 2. Trained and approved by the firestop manufacturer.
 3. Shown to have successfully completed not less than five comparable scale projects.
 4. FM approved in accordance with FM Standard 4991, Approval of Firestop Contractors.
 5. UL Qualified Firestop Contractor.
- C. Single Source Limitations - Obtain firestop systems, for each kind of penetration and construction condition indicated from a single manufacturer.
- D. Materials from different firestop manufacturers shall not be installed in the same firestop system or opening.
- E. Firestopping material shall be asbestos-free and lead-free and shall not incorporate nor require the use of hazardous solvents.
- F. Firestopping sealants must be flexible, allowing for normal movement of adjacent materials.
- G. Firestopping materials shall not crack or pull back from contact surfaces such that a void is created.

- H. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
- I. Materials used shall be in accordance with the manufacturer's written installation instructions.
- J. Label each firestopping system installation with the following information:
 - 1. Firestopping product name.
 - 2. System listing number.
 - 3. Name and address of manufacturer
- K. Inspection of penetrations through fire rated floor and wall assemblies shall be in accordance with ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops.
- L. Inspection of fire-resistive joints and perimeter barriers shall be in accordance with ASTM E2393, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
 - 1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL or another agency performing testing and follow-up inspection services for perimeter fire containment systems acceptable to authorities having jurisdiction.
 - 2. Perimeter fire containment system products bear classification marking of qualified testing and inspection agency.

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture, lot number, UL or OPL classification marking, and mixing instructions for multi-component materials.
- B. Store and handle materials per manufacturer's instructions to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. All firestop materials shall be installed prior to expiration of shelf life.

1.08. PROJECT CONDITIONS

- A. Environmental Limitations - Install firestopping when ambient or substrate temperatures are within limits permitted by the manufacturer's written instructions. Do not install firestopping when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate per the manufacturer's written instructions on the product's Material Safety Data Sheet.
- C. Verify the condition of the substrates before starting work.

- D. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

1.09. SEQUENCING

- A. Sequence work to permit installation of materials in conjunction with other materials and seals.

1.10. COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that firestopping assemblies are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not conceal firestopping installations until the Owner's inspection agency or authorities having jurisdiction have examined each installation.
- D. Schedule firestopping after installation of penetrants but prior to concealing the openings.

PART 2 PRODUCTS

2.01. FIRESTOPPING, GENERAL

- A. Firestopping products specified in system design listings by UL or OPL may be used providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate assembly.
- B. Manufacturer of firestopping products shall have been successfully producing and supplying these products for a period of not less than three years and be able to show evidence of at least 10 projects where similar products have been installed and accepted.
- C. Accessories - Provide components for each firestop system that are needed to install fill materials and to comply with Article 1.05. Use only components specified by the firestopping manufacturer and approved by UL or OPL for the firestop systems indicated. Accessories include, but are not limited to the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Mineral wool insulation.
 - b. Foams or sealants used to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Polyethylene/polyurethane backer rod.
 - e. Rigid polystyrene board.
 - 2. Temporary forming materials.

3. Substrate primers.
 4. Steel sleeves.
- D. All firestopping products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.

2.02. MIXING

- A. For those products requiring mixing before application, comply with firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.03. MANUFACTURERS

- A. Subject to compliance with the requirements, provide products by one of the following:
1. Specified Technologies, Inc., Somerville, NJ
 2. 3M Fire Protection Products, St. Paul, MN
 3. Hilti, Inc., Tulsa, OK,
 4. Thermafiber, LLC, Wabash, IN
 5. Roxul, Inc., Milton, Ontario, CA
 6. Owens Corning, Toledo, OH
 7. Other manufacturers listed in the UL Fire Resistance Directory, Volume 2
 8. Or equal

2.04. MATERIALS

- A. General - Use only firestopping products that have been tested for specific fire resistance rated construction conditions conforming to construction assembly type, penetrating item type, or joint opening width and movement capabilities, annular space requirements, and fire rating involved for each separate instance.
1. Specific manufacturers' products listed serve as a basis for design. Similar systems by named manufacturers that meet performance criteria of that section are also acceptable.
 - a. Intumescent Firestop Sealants and Caulk - Single-component latex formulations that, upon cure, do not re-emulsify during exposure to moisture.
 - b. Elastomeric Water-Based Sealant - Single-component latex formulations that, upon cure, do not re-emulsify during exposure to moisture.

- c. Elastomeric Silicone Sealant (Single-Component) - Moisture curing, single-component, silicone elastomeric sealant for horizontal surfaces (pourable or non-sag) or vertical surfaces (non-sag).
 - d. Silicone Foam - Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
 - e. Firestop Putty and Pads
- 2. Putty - Intumescent, non-hardening, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
 - 3. Putty Pads - Intumescent, non-hardening pads or inserts for protection of electrical switch and receptacle boxes to reduce horizontal separation to less than 24 inches.
 - 4. Firestop Devices - Factory assembled steel collars lined to fit specific outside diameter of penetrating item.
 - 5. Wrap Strips - Single-component intumescent strips faced on both sides with plastic film.
 - 6. Firestop Mortars - Portland cement-based dry mix product formulated for mixing with water at project site to form a non-shrinking, water-resistant, homogeneous mortar.
 - 7. Firestop Bags/Pillows - Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame-retardant poly bag.
 - 8. Elastomeric Coating - A water-based, spray-applied elastomeric coating for joints between fire-resistive assemblies and perimeter barriers that cures to a strong flexible seal, accommodating seismic, wind, and thermal contraction/expansion movement. Used with partially compressed mineral fiber backing.
 - 9. Fire-Rated Cable Pathway - Modular devices composed of steel raceway with intumescent foam pads permitting 0 to 100 percent cable fill.
 - 10. Curtain Wall Insulation - Faced or unfaced batts or blankets used for exterior curtain walls with the capacity to contribute to the fire resistance of the assembly.
 - 11. Safing Insulation - Board or sheet products used as forming materials in slab edge openings with the capacity to provide a degree of the fire resistance required when used with an appropriate fill material..

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance. Notify Engineer of any unsatisfactory conditions.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify that all pipes, conduits, cables, and/or other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.02. PREPARATION

- A. Surface Cleaning - Clean out openings immediately before installing firestop systems to comply with written recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.
 - 4. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

3.03. PENETRATION FIRESTOP SYSTEMS

- A. General - Install through-penetration firestop systems to comply with Article 1.05 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Installation of firestopping shall be performed by an applicator/installer qualified as described in Article 1.07.
- C. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer's EJ per the manufacturer's installation instructions.
- D. Install forming/damming/backing materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire resistance ratings required.
- E. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they fully contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04. JOINT FIRESTOP SYSTEMS

- A. General - Install fire-resistive joint firestop systems to comply with required codes and ratings and with Article 1.05 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Installation of firestopping shall be performed by an applicator/installer qualified as described in Article 1.07.
- C. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer's EJ per the manufacturer's installation instructions.
- D. Install joint forming/damming materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths of installed firestopping material relative to joint widths that allow optimum movement capability and achieve fire resistance ratings required.
- E. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill joint as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they fully contact and adhere to substrates forming the openings.
 - 3. Completely fill recesses provided for each joint configuration.
 - 4. Tool non-sag firestop materials after their application and prior to the time skinning begins. Use tooling agents approved by the firestopping manufacturer.

3.05. PERIMETER BARRIER FIRESTOP SYSTEMS

- A. General - Install perimeter barrier firestop systems to comply with required codes and ratings and with Article 1.05 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Installation of firestopping shall be performed by an applicator/installer qualified as described in Article 1.07.
- C. Apply firestopping in accordance with UL or OPL listed system designs or manufacturer's EJ per the manufacturer's installation instructions.
- D. Install metal framing, curtain wall insulation, mechanical attachments, safing materials, and firestop materials as applicable within the system design.

3.06. FIELD QUALITY CONTROL

- A. Testing - The Owner will engage a qualified independent inspecting agency to inspect firestop systems, conduct material evaluation and application tests and prepare inspection reports. The Contractor shall cooperate fully and, when requested, permit samples of materials to be taken from original packaging as the materials are applied to building surfaces.

1. Inspection of completed installations of firestop systems shall take place in successive stages as installation of firestop systems proceeds. Do not proceed with installation of firestop systems for the next area until inspecting agency determines completed work shows compliance with requirements.
 2. Inspection agency shall state in each report whether inspected firestop systems comply with or deviate from requirements.
- B. Cost of Testing - If tests indicate that materials or work does not comply with requirements, the Contractor shall pay for tests performed, all retesting, and shall repair non-complying work. Where repair is not possible the Contractor shall remove and replace the firestop materials.
- C. Proceed with enclosing firestop systems with other construction only after inspection reports are issued and firestop systems comply with requirements.

3.07. CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as work progresses by methods and with cleaning materials that are approved in writing by firestopping manufacturer(s) and that do not damage materials in which openings occur. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.
- B. Provide final protection and maintain conditions during and after installation that ensure firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

END OF SECTION

SECTION 07900

JOINT SEALANTS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install joint sealers and accessories in accordance with the Contract Documents including, but not limited to the following:
 - 1. Sealants and caulking for non-submerged uses.
 - 2. Backer rods and accessories

1.02. REFERENCES

- A. ASTM C834 - Standard Specifications for Latex Sealants
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
- D. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
- E. ASTM E1966 – Standard Test Method for Fire-Resistive Joint Systems
- F. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- G. SWRI - Sealant, Waterproofing Restoration Institute. ANSI A117.1 – Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People

1.03. SUBMITTALS

- A. Provide in accordance with Section 01300, Submittals, and as supplemented herein. Submittals shall include, but not be limited to, the following:
- B. Manufacturer's Product Data – Manufacturer's literature describing performance characteristics validating product compliance with performance criteria specified and application procedures.
- C. Samples – Submit samples illustrating manufacturer's extended color range.

1.04. QUALITY ASSURANCE

- A. Manufacturer Qualifications - Company regularly engaged in manufacturing and marketing of products specified in this section.

- B. Installer Qualifications - Qualified to perform work specified by reason of experience or training provided by product manufacturer.
- C. Installation per manufacturer's instructions and SWRI.
- D. Perform acoustical sealant application work in accordance with ASTM C919.

1.05. DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.
- B. Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight in strict accordance with manufacturer's recommendations.
- C. Condition products to approximately 60 to 70 degrees F for use in accordance with manufacturer's recommendations.
- D. Handle all products with appropriate precautions and care as stated on Material Safety Data Sheets.
- E. Do not use material that has exceeded manufacturer's shelf life.

1.06. PROJECT CONDITIONS

- A. Do not use products under conditions of precipitation or freezing weather. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.
- B. Ensure substrate is dry.
- C. Protect adjacent work from contamination due to mixing, handling, and application of flexible epoxy joint filler.

1.07. WARRANTY

- A. Include coverage for replacement of sealant materials which fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

1.08. COORDINATION

- A. Coordinate the work of this section with all sections referencing this section or referenced by this section.
- B. Coordinate the work with existing opening construction and door hardware installation.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. Provide all joint sealers of the same type from a single manufacturer.

1. Manufacturer - Sika, BASF, Dow Corning, or equal.

B. Provide USDA and NSF approved sealants when indicated.

2.02. MATERIALS AND MANUFACTURERS

A. Multi-Component, Non-Sag Polyurethane Sealant - Sika Sikaflex 2cNS, BASF Sonolastic NP 2, or equal with +50 percent movement capability for vertical joints; ASTM C920, Type M, Grade NS, Class 25. USDA approved; SWRI validated; UL classified (fire resistance).

B. Two Component, Self-Leveling Polyurethane Sealant - Sika Sikaflex 2cSL, BASF Sonolastic SL 2, or equal with +25 percent movement capability for horizontal joints; ASTM C920, Type M, Grade P, Class 25; USDA approved.

C. Silicone Sealant - Sika SikaSil C990 or 995, BASF OmniPlus or Omniseal, Pecora 864, or equal. ASTM C920, Type S, Grade NS, Class 25 or 50.

D. Silicone Sealant Anti-Fungal - Sika S50, BASF Masterseal 121, Pecora 898NST, or equal. ASTM C920, Type S, Grade NS, Class 25 or 50.

E. Single Component Siliconized Acrylic Latex Sealant – BASF Sonolac, Bostik Chem-Calk 600, Pecora AC 20+ Silicone, or equal with +15 percent movement capability; ASTM C834.

F. Single Component pre-pressurized expanding polyurethane foam sealant equal to Sika “Sika Boom.”

G. Single Component Spray Applied Elastomeric Sealant – 3M Fire Dam Spray 200, Specified Technologies SpecSeal AS200, Tremco TremStop Acrylic SP; or equal with ± 25 percent movement capability; ASTM E84, max flame spread <25 , smoke developed <50 .

2.03. ACCESSORIES

A. Low VOC Primer - As recommended by manufacturer for particular sealant and substrate.

B. Joint Cleaner - Non-corrosive and non-staining type recommended by sealant manufacturer and compatible with joint forming materials.

C. Soft Backer Rod - Industrial Thermo Polymers Limited “104 Soft-Type Backer Rod,” Backer Rod Mfg. Inc. “Denver Foam” or equal; non-gassing, reticulated closed-cell polyethylene rod designed for use with cold-applied joint sealants.

1. Comply with ASTM C1330.

2. Size required for joint design.

- D. Closed-Cell Backer Rod - Industrial Thermo Polymers Limited "101 Standard Backer Rod," Deck-o-Seal "Kool-Rod" or equal closed-cell polyethylene rod designed for use with cold-applied joint sealants for on-grade or below-grade applications.
 - 1. Comply with ASTM C1330.
 - 2. Size required for joint design.
- E. Joint Filler - Canzac "Expansion Joint Filler," Sonneborn(R)/ChemRex "Expansion Joint Filler," or equal closed-cell polyethylene joint filler designed for use in cold joints, construction joints, or isolation joints wider than 1/4 inch (6 mm).
 - 1. Size required for joint design.
- F. Mineral Wool Batt Insulation – Owens Corning Thermafiber Safing or equal , 4.0 pcf, unfaced mineral fiber batts used as forming material for application of single-component spray-applied elastomeric sealant.
 - 1. Size required for joint design.
- G. Bond Breaker - Pressure-sensitive tape recommended by sealant manufacturer to suit application.

2.04. COLOR

- A. Sealant Colors – From manufacturer's extended range of colors. Match to adjacent materials as directed by the Schedule of Joint Sealants at the end of this section.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Inspect all areas involved in work to establish extent of work, access, and need for protection of surrounding construction.
 - 1. Verify that substrate surfaces and joint openings are ready to receive work.
 - 2. Verify that joint backing and release tapes are compatible with sealant.

3.02. PREPARATION

- A. Remove loose materials and foreign matter which impair adhesion of joint filler.
- B. Clean joints and saw cuts by grinding, sandblasting, or wire brushing to expose a sound surface free of contamination and laitance. Prime joints.
- C. Ensure structurally sound surfaces, dry, clean, free of dirt, moisture, loose particles, oil, grease, asphalt, tar, paint, wax, rust, waterproofing, curing and parting compounds, membrane materials, and other foreign matter.

- D. Where the possibility of joint filler staining of adjacent areas or materials exists, mask joints prior to application.
 - 1. Do not remove masking tape before joints have been tooled and initial cure of joint filler has taken place.
 - 2. Work stained due to failure of proper masking precautions will not be accepted.

3.03. INSTALLATION

A. Back-Up Material

- 1. Install appropriate size backer rod, larger than joint where necessary according to manufacturer's recommendations.
- 2. Install polyethylene joint filler in joints wider than 1/4 inch (6 mm) to back-up material per manufacturer's recommendations.
- 3. Do not install epoxy joint filler over backer rod.
- 4. Install mineral wool backer material at locations where elastomeric spray applied sealants are scheduled to be used by pressure fitting snugly into joint space.

- B. Bond Breaker - Install bond-breaker strip in joint to be sealed on top of back-up material to prevent adhesion of sealant to back-up material. Install per manufacturer's recommendations.

C. Sealant

- 1. Prepare sealants that require mixing. Follow manufacturer's recommended procedures, mixing thoroughly.
- 2. Mix only as much material as can be applied within manufacturer's recommended application time period.
- 3. Apply materials in accordance with manufacturer's recommendations. Take care to produce beads of proper width and depth, tool as recommended by manufacturer, and immediately remove surplus sealant.
- 4. Apply materials only within manufacturer's specified application life period. Discard sealant after application life is expired or if prescribed application period has elapsed.

3.04. CLEANING

- A. Remove uncured sealant and joint filler with sealant manufacturer's recommended solvent. Remove cured sealant and joint filler by razor, scraping, or mechanically.
- B. Remove all debris related to application of sealants from job site in accordance with all applicable regulations for hazardous waste disposal.

3.05. SCHEDULE OF JOINT SEALANTS

Sealant Type	Locations for Application	Color	Comments
Multi-component, non-sag polyurethane (UL classified)	Metal or FRP door, window, or louver frames at masonry openings	Match frame color	Prime frame as recommended by sealant manufacturer for particular factory finish
Multi-component, non-sag polyurethane	Vertical control or movement joints in masonry	Match mortar color	
Two-component, self-leveling polyurethane sealant	Control, movement, or perimeter joints in horizontal concrete	Match finished concrete color	
Silicone sealant	Glass at metal	Clear	
Silicone sealant Anti-fungal	Plumbing fixtures abutting other materials	Match color of plumbing fixture	
Single-component acrylic latex	Intersections of non-structural interior finish materials	White	Paint to match adjacent material
Polyurethane foam sealant	Gaps at windows, doors, louvers, and other openings	--	--
Elastomeric spray sealant	Gaps at intersections between CMU wall and galvanized metal roof deck	Gray or red (manufacturer's standard)	Back with mineral wool batt insulation

END OF SECTION

SECTION 08110

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. All doors as specified shall be extra heavy duty, Grade III, 1-3/4-inch thick, Model 2, seamless design per SDI-100-91.
- B. Non-rated and fire rated, steel doors, welded frames and interior window frames.

1.02. REFERENCES

ANSI-A250/SDI-100	Steel Door Institute Standard and Test Methods for Steel Doors and Frames
ANSI A117.1	Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People
ANSI A151.1	Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings
ASTM A653	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
ASTM E2074	Methods of Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies
Door Hardware Institute (DHI)	The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware
NFPA 80	Standard for Fire Doors and Windows
NFPA 252	Standard Methods of Fire Tests for Door Assemblies
SDI	Steel Door Institute Fact File
UL 10B	Underwriters Laboratory Standard for Fire Tests of Door Assemblies

1.03. SUBMITTALS

- A. Shop Drawings - Indicate door and frame elevations, reinforcement, closure method, cut-outs for louvers, undercuts, and finish.
- B. Manufacturer's Product Data - Indicate door and frame configurations, location of cut-outs for hardware reinforcement, anchor types and spacings.

1.04. QUALITY ASSURANCE

- A. Conform to requirements of SDI-Fact File and ANSI A117.1.

1.05. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum five years' documented experience and current member of the Steel Door Institute (SDI).

1.06. REGULATORY REQUIREMENTS

- A. Fire Rated Doors and Panel Construction – Conform to UL 10C. UL ratings for doors and frames to be as follows:
 - 1. “A” label equals to 3-hour rating.
 - 2. “B” label equals to 1-1/2-hour rating.
 - 3. “C” label equals to 3/4-hour rating.
- B. Fire Rated Door Construction – Rate of rise of 450 degrees F across door thickness.
- C. Installed Door and Frame Assembly – Conform to NFPA 80 for fire rated class as scheduled.

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of this section. Store off ground in weathertight enclosure while affording proper air circulation.
- B. Accept doors and frame on site in manufacturer's packaging.
- C. Break seal on-site to permit ventilation and inspect for damage.

1.08. FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings and instructed by the manufacturer.

1.09. COORDINATION

- A. Coordinate the work with door opening construction, door frame, and door hardware installation, and glazing requirements.

PART 2 PRODUCTS

2.01. DOOR MANUFACTURERS

- A. Amweld Building Products, Inc. - Product: 700 Series.
- B. Ceco Door Division - Product: Imperial Series.

- C. Curries Company - Product: Curries 707.
- D. The Steelcraft Mfg. Company - Product: "LW" Series.

2.02. DOORS AND PANELS

- A. Doors and steel accessories to be galvanized material; commercial class weighing not less than 0.30 oz/psf per side. Zinc-applied as ductile coating to both sides, bonded tightly to base metal. Wipe Coat Galvanized Steel (WCGS) is not acceptable.
- B. Reinforce, drill, and tap doors to receive mortised hinges, locks, latches, flush bolts, and concealed closers as required. Such preparations for door hardware shall be performed by the door manufacturer in the factory.
- C. Doors and metal panels to be SDI Extra Heavy Duty, Grade III, Model 2, 1-3/4-inches thick (minimum); seamless design, stretcher leveled, no exposed joints or seams, and fully enclosed.
- D. No field welding permitted on factory fabricated units.

2.03. DOOR AND PANEL CONSTRUCTION

- A. Face - Steel sheet 16-gauge steel.
- B. Core - Reinforced, stiffened, sound deadened and insulated with polyurethane or polystyrene core.
- C. Core of door to resist vermin, mildew, or rot.

2.04. FRAMES

- A. Frames – 14-gauge thick material for all doors.
- B. Spreaders to be provided for all frames.

2.05. ACCESSORIES

- A. Apply protective coating to concealed steel surfaces in contact with cementitious materials or dissimilar metals.
- B. Silencers – Provide at all interior doors not equipped with weatherstripping – resilient rubber, fitted into drilled hole. Glynn Johnson No. 64 or equal.
 - 1. Three single silencers for single doors.

2.06. FABRICATION

- A. Fabricate doors with hardware reinforcement welded in place.
- B. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.
- C. Fabricate frames as welded unit.

- D. Anchors to be as recommended by manufacturer for use with masonry construction.
 - 1. UL at labeled doors.
- E. Use adjustable base anchors at jambs or mullions using appropriate anchor type.
- F. Side jamb anchors at 2 feet 0 inches o.c. maximum.
- G. Provide for full mortise hardware, reinforced, drilled, tapped for hinges, lock strikes and all other hardware at factory.
- H. Attach fire rated label to each door frame unit indicated as labeled on Drawings.
- I. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- J. Provide mortar guard boxes as protection for mortise hardware cut-outs.

2.07. FINISH

- A. Steel Sheet - Galvanized to ASTM A526; A60.
- B. Primer – Baked-on rust-inhibitive type.
- C. Factory Finish - Doors, panels and frames to be bonderized over galvanized surface, shop painted with baked-on rust-inhibitive primer. Finish coat in field per finish schedule and Section 09900, Painting.
- D. Any damage to primed galvanized surfaces, after installation, to be cleaned and touched up with zinc-rich paint.
- E. Do not paint over fire labels.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that opening sizes and tolerances are acceptable.
- B. Do not fill thermally broken frames with grout.

3.02. INSTALLATION

- A. Install doors and frames in accordance with SDI Fact File.
- B. Install door louvers, plumb and level.
- C. Coordinate installation of doors with installation of hardware specified in Section 08710, Door Hardware.

3.03. ERECTION TOLERANCES

- A. Maximum Diagonal Distortion - 1/16-inch measured with straight edge, corner to corner.

3.04. ADJUSTING

- A. Adjust door for smooth and balanced movement.

END OF SECTION

SECTION 08220

FIBERGLASS DOORS AND FRAMES

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Fiberglass reinforced plastic (FRP) doors and frames.
 - 1. Fire-rated side-hinged flush door and frame assemblies.
 - 2. Non-rated side-hinged door assemblies.

1.02. REFERENCES

- A. SDI - Steel Door Institute Fact File
- B. AAMA 920 – Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems
- C. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors
- D. ASTM E84 - Surface Burning Characteristics of Building Materials
- E. NFPA 252 – Standard Methods of Fire Tests for Door Assemblies
- F. UL 10C – Standard for Positive Pressure Fire Tests of Door Assemblies

1.03. PERFORMANCE REQUIREMENTS

- A. Where a time duration is shown in the Label column of the Door Schedule on the Drawings, or a where a fire rating is indicated for a wall or partition in the Drawings, provide door and frame assemblies:
 - 1. Tested in accordance with NFPA 252 or UL 10C, and
 - 2. Labeled by an Approved Agency per the Building Code of New York State for the duration indicated.
- B. Provide doors and frame combinations that, when tested as an assembly, have successfully withstood one million swing cycles when tested in accordance with ANSI A250.4 or AAMA 920.
- C. Provide doors and frames with surface burning characteristics on face sheets exposed to building interior spaces not to exceed a flame spread rating of 25 or a smoke developed rating of 450 when tested in accordance with ASTM E84.

1.04. SUBMITTALS

- A. Product Data - Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
- B. Shop Drawings - Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, and finish.
- C. Samples
 - 1. Door - Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
 - 2. Color - Submit manufacturer's samples of optional colors of doors and frames.
- D. Test Reports - Submit test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
- E. Maintenance Instructions - Submit manufacturer's maintenance and cleaning instructions for doors.
- F. Warranty - Submit warranty meeting conditions of paragraph 1.04.D. and Article 1.09 of this section.

1.05. QUALITY ASSURANCE

- A. Provide door and frame components from the same manufacturer.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Delivery - Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
- B. Storage - Store materials in clean, dry area indoors in accordance with manufacturer's instructions.

1.07. COORDINATION

- A. Coordinate the work with door opening construction, door frame and door hardware installation.
- B. Coordinate door and frame preparations with Section 08710, Door Hardware.

1.08. WARRANTY

- A. Ten years against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
- B. Lifetime against failure due to corrosion on FRP components.

PART 2 PRODUCTS

2.01. DOOR MANUFACTURERS

- A. Special-Lite, Inc.
- B. CORRIM Company
- C. Chem-Pruf Door Company

2.02. PRODUCTS

- A. Fire-Rated Flush Door and Frame Assemblies - Special-Lite FR series or CORRIM equivalent with rating duration as scheduled or required on Drawings.
- B. Non-Rated Flush Door and Frame Assemblies - Special-Lite AF-200 or CORRIM equivalent.
- C. Or equal.

2.03. MATERIALS

- A. Doors
 - 1. Thickness - 1-3/4-inch.
 - 2. Cores
 - a. Non-Rated Doors - Polyurethane foam, center-of-door R-value no less than 9.
 - b. Fire-Rated Doors - Mineral.
 - 3. Pultruded FRP internal framing.
 - 4. Face Sheets - FRP no less than 0.120 inches thick, factory polyurethane finish.
 - a. Not gel-coated.
 - 5. Provide factory cut-outs and glazing materials for vision lites as shown on Drawings for glazing types specified in Section 08800, Glazing.
- B. Frames
 - 1. Pultruded FRP.
 - 2. Profile - Double rabbet 2-inch face with 5-3/4-inch profile and 1-15/16-inch rabbet, or as shown on drawings.

2.04. FABRICATION

- A. Finished doors and frames to be strong, rigid, neat in appearance, free from defects; waves, scratches, cuts, dents, ridges, holes, warp, and buckle.

2.05. FINISH FOR DOORS AND FRAMES

- A. Finish – Standard textured or smooth finishes to be selected by owner / engineer.
- B. Color - Factory gel coat as selected by Owner/Engineer for manufacturer's standard and optional colors. A custom color may be required to match existing elements.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify substrate conditions before installing frames, as beginning of installation indicates acceptance.
- B. Verify that opening sizes and tolerances are acceptable.

3.02. INSTALLATION

- A. Install doors in accordance with SDI Fact File.
- B. Coordinate installation of doors with those sections listed in Article 1.02.
- C. Field alterations shall not be allowed. Modify at manufacturer's factory.

3.03. ADJUSTING AND CLEANING

- A. Adjust door for smooth and balanced movement.
- B. Remove dirt and excess sealant from exposed surfaces.
- C. Follow manufacturer's instructions.

END OF SECTION

SECTION 08310

ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for ceilings.

1.03. ALLOWANCES

- A. Access doors and frames are part of a security access door and frame allowance.

1.04. ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details materials, individual components and profiles, and finishes.
- B. Samples: For each type of security access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

PART 2 PRODUCTS

2.01. SECURITY ACCESS DOORS AND FRAMES

- A. Medium-Security Flush Access Doors with Exposed Flanges:
 - 1. Locations: Ceiling.
 - 2. Door Size: 60"x21" to fit between wood trusses.
 - 3. Uncoated Steel Sheet for Door: Nominal 0.075 inch, 14 gage; factory primed.
 - 4. Frame Material: Same material, thickness, and finish as door Minimum 3/16-by-1-1/2-by-1-1/2-inch) angle welded with joints ground smooth; factory primed.
 - 5. Hinges: Manufacturer's standard security hinge.
 - 6. Latch and Lock: Detention deadbolt with parametric key.

2.02. MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.03. FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- D. Latch Hardware:
 - 1. Quantity: Furnish number of latches required to hold doors tightly closed.

2.04. FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Factory-Primed Finish: Apply manufacturer's standard lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.03. ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION

SECTION 08390

PRESSURE-RESISTANT PLANK SYSTEM

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Single flood plank barrier with jambs, planks, sill, and latching hardware.
2. Flood plank storage cart.

1.02. SUBMITTALS

A. Manufacturer's data sheets on each product to be used, including:

1. Storage and handling requirements and recommendations.
2. Installation instructions.

B. Shop Drawings: Provide shop drawings showing layout, profiles, and product components, including anchorage, hardware, and finishes. Include dimensional plans, applicable material specifications, elevations and sections detailing mounting and connections, and load diagrams.

C. Calculations: Upon signed finalization and approval of dimensions, mounting location material and configuration, and load requirements.

1. Submit stamped calculations by a registered professional engineer from within the state or territory where the project will be constructed or substantially improved, to verify the flood barrier's ability to withstand the design loading.

1.03. CLOSEOUT SUBMITTALS

A. Closeout Submittals: Provide Operation and Maintenance data to include methods for maintaining installed products, precautions against cleaning materials and methods detrimental to finishes and performance.

1.04. QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer must demonstrate a minimum of five (5) years successful experience in design and manufacture of similar flood related closures. Upon request, provide supporting evidence including list of installations, descriptions, name and method of contact.

- B. Minimum Qualifications: Manufacturer must demonstrate compliance and certification of a Quality Management System administered by the International Organization for Standardization (ISO). Documentation of current certification status to be provided upon request.
- C. Welder Qualifications: Welders Certified in accordance with American Welding Society Procedures for applicable material used in production of specified product.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging container with identification labels intact until ready for installation.
- B. Protect materials from exposure to moisture during storage.
- C. Store materials in a dry, warm, ventilated weathertight location. If outdoor storage is required, block materials to store at an incline, to prevent pooling of any moisture and promote runoff. Tarp materials in a tent-like arrangement, elevated above the product with open sides to allow airflow. Store all other hardware in a dry controlled environment.
- D. Use caution when unloading and handling product to avoid bending, denting, crushing, or other damage to the product.
- E. When using forklifts, use forks of proper length to fully support product being moved. Consult Approved for Construction drawings or consult with factory for proper lift points.

1.06. PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's indicated limits.

1.07. COORDINATION

- A. Conduct site survey and provide to flood barrier manufacturer, prior to manufacturers' commencement of shop drawings; the actual site conditions of the mounting location, to include; material type, dimensions and configuration, interferences with mounting surface, or any other condition that may impact the ability of the flood barrier to be properly installed.
- B. Coordinate work with other operations and installation of adjacent materials to avoid damage.

1.08. WARRANTY

- A. Manufacturer's Standard Warranty: Product to be free from defects in material and workmanship for a period of one (1) year from date of shipment.

PART 2 PRODUCTS

2.01. PERFORMANCE REQUIREMENTS

- A. Design watertight flood planks to support, solely or in combinations of, temporary super-imposed live loads as indicated below. All applied types of flood related loadings are transferred from the flood product barriers, solely or in combinations of, by mullion anchorage to structural floor slabs and/or jamb anchorage and direct pressure contact to structural walls or other structural elements.
 - 1. Hydrostatic Loading.
 - 2. Hydrodynamic Loading.
 - 3. Debris Impact Loading.
 - 4. Wave Loading (Dynamic/ Non-Breaking or Broken Wave).
- B. Engineering Code Practices: Engineer flood products to conform to the design requirements that are based on the latest adopted edition of the 2020 Building Code of New York State. LRFD and/or ASD methodologies are applied as appropriate to align with specific project specifications and/or limited published material data.
- C. Water Density: 64 pcf, unless otherwise noted on “Approved for Construction” drawings.
- D. Deployment: No sealant required on planks during deployment – watertight protection that deploys quickly without mess or drying time.

2.02. MANUFACTURERS

- A. Watertight Flood Plank Barriers:
 - 1. Approved Manufacturer: PS Flood Barriers or Equal
 - a. Basis of Design Product: Model: FP 530/FP 535.
 - 2. Substitutions: as per equal.
- B. Single Source Responsibilities: Obtain all watertight barriers and flood plank assemblies from single manufacturer.

2.03. EQUIPMENT

- A. Products Details:
 - 1. Sealing Requirements: Flood Plank and gasket design shall provide an effective barrier against short-term high-water situations, to the protection level indicated on drawings.
 - 2. Latching: Provide with pad-lockable latching to secure deployed barrier from tamper or theft. One (1) latch per jamb.

3. Operation: Flood Planks and latches to be non-handed to allow for reversible installation.
4. Mounting/Load Transfer: Anchor to existing structure. Flood Plank designed for specified hydrostatic pressure (and other loads as specified) and will transfer loads to adjacent structure.
5. Frame to be cast-in-place or anchored utilizing mechanical, chemical or other framing methods as designed. Manufacturer to include all anchors, water-stop, and sealants, as designed, unless otherwise noted.
6. Jamb mounting location:
 - a. Wall Face Mount:
 - 1) Positive Pressure Loading, (direction of loading against flood plank so as to force the barrier against the wall structure - "seating").
 - 2) Reverse Pressure Loading, (direction of loading against flood plank so as to force the barrier away from the wall structure - "unseating").

2.04. MATERIAL

- A. Flood Plank: Aluminum: 6000 Series alloy.
- B. Gaskets: Factory mounted, compressible rubber type, field replaceable. Gasket does not require air inflation.
 1. Material: UV resistant EPDM unless otherwise noted.
- C. Frame to include jamb and optional sill members for field locating and installation on structure. Jamb members to be designed and fabricated with appropriate material as required for the loading.
 1. Aluminum of appropriate size and strength with welded or mechanical fastened construction.
- D. Sill:
 1. No sill required, bottom gasket to seal to concrete surface. Contractor to ensure concrete sealing surface area is level (+/- 1/16 inch per 10 foot of barrier), smooth, unbroken, without cracks or relief joints.
- E. Frame Mounting Hardware: Provide anchors, sealant, and water stop, as required.
- F. Operating Hardware:
 1. Provide hardware sized for the size and weight of the flood plank and loads.
 2. Hardware to be factory located on jambs and plank panels, as practical.
 3. Latching hardware to be as indicated on the "Approved for Construction" Drawings.

- 4. Flood plank panel to be factory prepared for applicable latching devices.
- G. Aluminum: Mill finish, welds ground smooth, not polished.
- H. Labeling. Each watertight plank and jamb will be individually identified for matched installation.
- I. Instruction Placard: Provide pictorial and written operation instruction placards on flood plank.
- J. Flood plank storage cart: basis of design - HydroDefense® Flood Plank™ Racking System.
- K. Fit and factory assemble items in largest practical sections, for shipment to site.
- L. Fabricate items with joints tightly fitted and secured.
- M. Supply components required for anchorage of fabrications, unless otherwise noted.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another subcontractor, notify Architect of uncompleted preparation before proceeding.
- C. Inspect opening for compliance with flood plank manufacturer requirements. Verify opening conditions are within required tolerances.

3.02. PREPARTION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03. INSTALLATION

- A. Install in accordance with manufacturer's installation instructions, "Approved for Construction" Drawings, shipping, handling, and storage instructions, and product carton instructions for installation.
- B. Sills, jambs, and mullions shall be installed level, square, plumb, and rigid.
- C. Sealants, water-stop, and grouting to be completed by appropriate personnel, and in accordance with product application directions, manufacturer's instructions, and "Approved for Construction" Drawings.
- D. Tolerances: All dimensional requirements must be in accordance with manufacturer's installation instructions and "Approved for Construction" Drawings.

- E. Products to be operated and field verified that sealing surfaces maintain contact at the correct sealing points.
- F. Inspect gaskets for damage, wear, and adhesion. Replace compromised gaskets immediately.
- G. Verify that latching assemblies operate freely and correctly.
- H. Verify all anchorage is in accordance with manufacturer's installation instructions and applicable data sheets.
- I. Inspect installation sealants to ensure a watertight juncture.

3.04. FIELD QUALITY CONTROL

- A. Field Testing:
 - 1. Installer to construct temporary water barrier and test installed flood barrier under hydrostatic conditions.

3.05. CLEANING

- A. Touch-up, repair or replace damaged products or components before Substantial Completion.
- B. Clean all sealing surfaces.

3.06. PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

SECTION 08392

WATERTIGHT DOOR FRAMES

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Single Swing Industrial Swing Doors with Frames.
2. Door Hardware.

1.02. SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation instructions.

B. Shop Drawings: Provide shop drawings showing layout, profiles, and product components, including anchorage, hardware, and finishes. Include dimensional plans, applicable material specifications, elevations and sections detailing mounting and connections.

1. Contractor to provide manufacturer with field measurements and mounting structure prior to commencement of shop drawings.

C. Calculations: Upon signed finalization and approval of dimensions, mounting location material and configuration, and load requirements.

1. Submit stamped calculations by a registered professional engineer from within the state or territory where the project will be constructed or substantially improved, to verify the flood door's ability to withstand the design loading.

1.03. CLOSEOUT SUBMITTALS

A. Provide Operation and Maintenance data to include methods for maintaining installed products, precautions against cleaning materials and methods detrimental to finishes and performance.

1.04. QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer must demonstrate a minimum of five (5) years successful experience in design and manufacture of similar related closures. Upon request, provide supporting evidence including list of installations, descriptions, name, and method of contact.

- B. Minimum Qualifications: Manufacturer must demonstrate compliance and certification of a Quality Management System administered by the International Organization for Standardization (ISO). Documentation of current certification status to be provided upon request.
- C. Welder Qualifications: Welders Certified in accordance with American Welding Society Procedures for applicable material used in production of specified product.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging container with identification markings intact until ready for installation.
- B. Protect materials from exposure to moisture during storage.
- C. Store materials in a dry, warm, ventilated weathertight location. If outdoor storage is required, block materials to store at an incline, to prevent pooling of any moisture and promote runoff. Tarp materials in a tent-like arrangement, elevated above the product with open sides to allow airflow. Store loose or high value components in a dry, controlled environment.
- D. Use caution when unloading and handling product to avoid bending, denting, crushing, or other damage to the product.
- E. When using forklifts, use forks of proper length to fully support product being moved. Consult "Approved for Construction" drawings or consult with factory for proper lift points.

1.06. PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's indicated limits.

1.07. COORDINATION

- A. Conduct site survey and provide to manufacturer, prior to manufacturer's commencement of shop drawings, the actual site conditions of the mounting location, to include; material type, dimensions and configuration, interferences with mounting surface, or any other condition that may impact the ability of the gate to be properly installed.
- B. Coordinate work with other operations and installation of adjacent materials to avoid damage.

1.08. WARRANTY

- A. Manufacturer's Standard Warranty: Product to be free from defects in material and workmanship for a period of five (5) years from date of shipment.

PART 2 PRODUCTS

2.01. PERFORMANCE REQUIREMENTS

- A. Design industrial swing doors to support, solely or in combines of, temporary super-imposed live loads as indicated below. All applied types of related loadings are transferred from industrial product barriers, solely or in combinations of, by anchorage to structural floor slabs and/or jamb anchorage and direct pressure contact to structural walls or other structural elements.
 - 1. Positive Wind/Draft Pressure Loading
- B. Engineer Code Practices: Engineer industrial products to conform to the design requirements that are based on the latest adopted edition of the International Building Code (IBC). LFRD and/or ASD methodologies are applied as appropriate to align with specific project specifications and/or limited published material data.

2.02. SWING INDUSTRIAL DOOR WITH FRAME

- A. Description: Swing, Industrial Metal Door including door frame, door panel, threshold, and/or door hardware.
 - 1. Approved Manufacturer: PS Access Solutions™, which is located at: 1150 S. 48th Street, Grand Forks, ND 58201; Toll Free Tel: 877.446.1519; Email: 4psinfo@psindustries.com; Web: www.psaccesssolutions.com or www.psindustries.com
 - a. Basis of Design Product: Model: SWG.
- B. Substitutions: as per equal.
- C. Single Source Responsibilities: Flood door assemblies from single manufacturer.

2.03. EQUIPMENT

- A. Products Details:
 - 1. Sealing Requirements: EPDM, Brush Seal, or combination, design shall provide an effective barrier against wind, hot/cold temp differences, dust, debris, and moisture.
 - 2. Operation: Provide with hardware operable from both sides.
 - 3. Mounting/Load Transfer: Anchor to existing structure. Industrial Door designed for specific loads and will transfer loads to adjacent structure.
 - 4. Frames to be anchored utilizing mechanical, chemical or other framing methods as designed. Manufacturer to provide anchors, unless otherwise noted or existing structure is no specified.
 - 5. Provide rectangular door opening with square corners to facilitate easy passage.

2.04. MATERIALS

- A. Exposed sheet metal of industrial door panel to be formed of the following material type.
 - 1. Stainless Steel Type 304: stainless steel of appropriate size and strength, welded and structurally bonded.
- B. Industrial door internal structure to be structural tubes, plates, and formed shapes of the following material type.
 - 1. Stainless Steel Type 304 or 316: stainless steel of appropriate size and strength with welded construction.
- C. Weatherseals to be compressible rubber type or brush, field replaceable.
 - 1. Material: UV Resistant EPDM, and Nylon unless otherwise noted.
- D. Door Frame to be manufactured of the same material type and finish as door panel. Frame to include jambs, header jamb, and threshold (optional) members for field location and installation on structure. Jamb members to be designed and fabricated with appropriate material as required for the loading.
- E. Thresholds:
 - 1. Stainless Steel: Custom designed, factory formed.
- F. Frame Mounting Hardware: Provide anchors, as required.
- G. Operating Hardware: Provide hardware appropriate for the size and weight of the industrial swing door and loads. Hardware to be factory located on jambs and door panels, as practical. Latching hardware to be as indicated on drawings. Industrial door panel to be factory prepared for applicable latching devices.
 - 1. Hinges: Sized to the requirements of the door
 - 2. Standard Hardware:
 - a. Exterior: Von Duprin 996L lever, classroom function.
 - b. Interior: Von Duprin 98/99 series Rim exit device.
 - c. Exterior: Oversized Bow Handle provided for easy gloved hand operation (Powder coat #49 gray finish); Cylindrical/ Mortise Lock; or PSI Bar Latch.
 - d. Interior: Cylindrical/ Mortise Lock; or Push Plate.
 - 3. Hardware prep only: Cylindrical lockset, mortise lockset, or panic hardware.
 - 4. Closer; Townsteel TDC40, Heavy Duty Grade 1 (AL689 finish).
- H. Placards: Factory mounted, decal labels for product identification.

I. Finish:

1. Steel Shop Finish: Apply the following paint system in accordance with manufacturer recommendations and instructions.
2. Stainless Steel products to be mill finish, welds are ground smooth, not polished.
 - a. No. 2b, products to be mill finish, welds are ground smooth, not polished.
3. Labeling: Each door will be individually identified for matched installation.

2.05. FABRICATION

- A. Fit and factory assemble items in largest practical sections, for shipment to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Do not begin installation until mounting substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another subcontractor, notify Architect of uncompleted preparation before proceeding.
- C. Inspect opening for compliance with manufacturer requirements. Verify open conditions are within required tolerances.

3.02. PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03. INSTALLATION

- A. Install in accordance with manufacturer's installation instructions, "Approved for Construction" drawings, shipping, handling, and storage instructions, and product carton instructions for installation.
- B. Frames must be installed level, square, plumb, and rigid.
- C. Tolerances: All dimensional requirements must be in accordance with manufacturer's installation instructions and "Approved for Construction" drawings.

- D. Verify all anchorage is in accordance with manufacturer's installation instructions and applicable data sheets.
- E. Inspect weatherseal for damage, wear, and adhesion. Replace compromised weatherseals immediately.

3.04. FIELD QUALITY CONTROL

- A. Field Testing:
 - 1. Installer to operate and field verified products including the sealing surfaces to assure that they maintain contact at the correct sealing points.
 - 2. Installer to verify that hinges and latching assemblies operate freely and correctly.

3.05. CLEANING

- A. Touch-up, repair or replace damaged products or components before Substantial Completion.
- B. Clean all sealing surfaces.

3.06. PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION

SECTION 08710

DOOR HARDWARE

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Hardware for doors, including, but not limited to, thresholds, hinges, locksets, closers, and weatherstripping/gasketing.
 - 1. All finish hardware necessary to complete the work, in sufficient quantities to meet the project requirements even though every such item is not specifically mentioned, including the correct number of screws of proper size, materials, and finish for each piece of hardware and all parts necessary to put all hardware in operating condition.
 - 2. All labor, equipment and materials necessary to furnish and install all finish hardware complete in place, and as shown on the drawings, specified herein and approved by the Engineer.
 - 3. The services of a Door and Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) certification level or above.
 - a. AHC consultant shall review and certify submittals prior to submission to Engineer for review
 - b. AHC consultant shall provide (minimum) two hours of training with client to review hardware operation, maintenance and adjustment procedures prior to final closeout of project.
 - 4. Master keyed cylinders used for entrance doors.

1.02. COORDINATION

- A. The Contractor will be required to coordinate the related work of other sections with the work of this section and be responsible for the timely and expeditious performance of same.
- B. Required coordination includes, but is not limited to, preparation requirements for doors and frames
- C. Coordinate internal hardware reinforcement of frames and doors.
- D. Coordinate the compatibility of door preparations with suppliers of all the types of doors provided for the project.
- E. Coordinate the compatibility of electronic locking hardware with associated elements, including exit device hardware and (where applicable) existing hardware.

1.03. REFERENCES

ANSI A117.1	Accessible and Usable Buildings and Facilities, Provisions of ADA Relating to Accessible Routes and Signage
NFPA 80	Fire Doors and Windows
NFPA 101	Code for Safety to Life from Fire in Buildings and Structures
SDI (Steel Door Institute)	Hardware Mounting
UL 10B	Fire Tests of Door Assemblies
UL 305	Panic Hardware
DHI (Door and Hardware Institute)	Architectural Hardware Consultant certification program; Sequence and Format for Hardware Schedule
ANSI/BHMA A156.2	Bored and Preamsembled Locks and Latches
ANSI/BHMA A156.3	Exit Devices
ANSI/BHMA A156.13	Mortise Locks and Latches

1.04. SUBMITTALS

A. Submittal shall include:

1. Hardware Schedule – Submit in vertical format as illustrated by the DHI’s “Sequence and Format for the Hardware Schedule.” Hardware schedule shall clearly indicate the Engineer’s hardware group and the manufacturer of each item proposed. A certified Architectural Hardware Consultant shall review the schedule prior to submission. The Architectural Hardware Consultant shall provide evidence of DHI certification and his or her review of the schedule for coordination and code compliance.
 - a. Review specified and proposed hardware for suitability and adaptability to details and surrounding conditions. Indicate unsuitable or incompatible items and proposed substitutions in hardware schedule.
 - b. Provide listing of manufacturer’s template numbers for each item of hardware in hardware schedule.
 - c. Promptly furnish other Contractors and subcontractors with copies of final approved hardware schedule and templates.
2. Manufacturer’s product data and specifications with selections and criteria highlighted in a fashion that is visible when printed copies are made.

- B. Manufacturer’s Installation Instructions - Indicate special procedures, perimeter conditions requiring special attention, and provide special tools of each size and type required for adjustment of hardware items. Turn over to Owner in good condition at project’s end.

1.05. OPERATION AND MAINTENANCE DATA

- A. Provide to Owner maintenance and adjustment data, templates, catalog pages for each product, special tools required for servicing hardware components that would only be available from hardware manufacturer, and name, address and phone number of a local representative for each manufacturer.
 - 1. Provide hands-on training in maintenance, adjustment and use of special tools required and furnished by hardware supplier.

1.06. QUALITY ASSURANCE

- A. Perform work in accordance with listed references in Article 1.04.
- B. Hardware supplier is responsible for providing fire-rated hardware regardless of Contract Documents' depiction.
- C. Qualifications of Manufacturers - Products used in the work of this section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the Engineer.

1.07. REGULATORY REQUIREMENTS

- A. Work shall conform to 2015 IBC.
- B. Hardware supplier is responsible for providing proper hardware to meet UL requirements regardless of Contract Documents' depiction.

1.08. DELIVERY, STORAGE, AND HANDLING

- A. Individual hardware items to be packaged and labeled. Package individual hardware items into labeled hardware sets.
- B. Deliver keys to Owner by security shipment or certified mail direct from hardware supplier. Deliver "construction keying" masters that will void construction keys at substantial completion.
 - 1. Maintain original master and each change key in secure location.
- C. Protection – Use all means necessary to protect materials of this section before, during and after installation and to protect installed work and materials of all other trades.
- D. Replacements – In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer at no additional cost to the Owner.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Burns Manufacturing, Erie, PA.

- B. Corbin Russwin, Monroe, NC.
- C. Dorma Architectural Hardware, Reamstown, PA.
- D. Glynn-Johnson, Indianapolis, IN.
- E. Hager Companies, St. Louis, MO.
- F. Ives, Indianapolis, IN.
- G. KABA-Ilco, Kaba Access Control, Winston Salem, NC
- H. National Guard Products.
- I. Pemko Mfg. Co., Memphis, TN.
- J. Rockwood Mfg. Co., Rockwood, PA.
- K. SARGENT Manufacturing Company, New Haven, CT
- L. Schlage Allegion, Dublin, Ireland
- M. The Stanley Works, New Britain, CT.
- N. Or equal.

2.02. PRODUCTS SUPPLIED

- A. Provide all hardware, fasteners, and accessories necessary to achieve fully functioning and smoothly operating doors in compliance with the codes cited in Part 1 of this section, and with the door schedule on the Drawings and the hardware group schedule in this section of the specifications.
- B. Wherever technically feasible, all hardware of the same functional type shall be from a single manufacturer throughout the project, regardless of door material or other variables. For example, all door closers shall be from a single manufacturer. Locksets may be from a different manufacturer than door closers, but all locksets must be from a single manufacturer.

2.03. HARDWARE TYPES

- A. Thresholds to be extruded aluminum with skid-resistant surface, meeting ADA requirements.
 - 1. Thermal barrier threshold (5 inches wide); National Guard Products 8425 or Pemko 252x3AFG.
 - 2. Saddle threshold (3 inches wide); National Guard Products 896A or Pemko 2005A. Use with exterior aluminum entry doors.
 - 3. Saddle threshold (5 inches wide); use with interior doors where threshold is scheduled.

- a. National Guard Products - 425
- b. Pemko - 171A.
- c. Or equal.

Thresholds and saddles are to be set in full bed of sealant, coped to frame, and secured with countersunk stainless steel screws and expansion shields.

B. Mortised Hinges - 4-1/2-inch by 4-1/2-inch for doors up to and including 38-inch wide doors; 5-inch by 5-inch for doors over 38 inches in width, up to 48 inches in width. Provide with non-removable pins on exterior reverse bevel doors. Use three hinges per leaf up to and including 7 feet 6 inches and one additional hinge for each additional 30 inches of door height. Maximum spacing of 30 inches between hinges on transom door panels.

1. Interior/exterior aluminum, stainless steel, or FRP doors; Hager BB1199-US32D, Stanley FBB199-US32D, or equal.
2. Interior steel doors with or without closers; Hager BB1199-US32D, Stanley FBB 179-US26D, or equal.
3. Interior steel doors heavy duty or high use, with or without closers; Hager BB1199-US32D, Stanley FBB199-US26D

C. Locksets, Latch Sets, and Exit Devices

1. Provide locksets, latch sets, and exit devices as shown by the table below. Locksets and latch sets to be Grade 1 per the applicable standards: ANSI/BHMA A156.2 or ANSI/BHMA A156.13.
 - a. Provide stand-alone, battery powered, electronic access control system at all exterior building entrances and as scheduled. System shall provide the following features: minimum 2,000-user capacity per lock, 6-bit key override (with 6 keys supplied), capability to toggle lock on/off or pre-program timed re-lock, software control for PIN only, PROX only, or both (dual credential) entry.
 - b. Provide manufacturer's specific software for door operator, complete with card enroller, hand held digital transfer device (DTD) or personal digital assistant (PDA), cables/connectors, and all hardware required to program/download door operator.
2. Acceptable Manufacturers
 - a. Corbin Russwin Access 800 AC2
 - b. KABA-Ilco Access Control E-Plex 5700
 - c. Sargent Profile Series v G.1.5
 - d. Schlage AD PRK Series.

e. Or equal products by Dorma

f. Or equal

Designation	Description	ANSI Function	Sargent Product	Corbin Russwin Product	Dorma Product	Kaba Ilco Product
L1	Passage lockset, single door	F01	8215 LE2L	ML2010 NSP	ML9040 CLCM	--
L2	Privacy lock, single door	F02	8215 LE2L	ML2020 NSP	ML9040 CLCM	--
L3	Dormitory lock, single door	F13	8225 LE2L	ML2065 NSP	ML9056 CLCM	--
L3A	Storage and entrance lock, single door	F04	8878 LE2L	ML20834 NSP	--	E5767B WL630-41
L4	Exit – single door with lock, exterior lever	F08	8977 777 ETL	ED5200 x 9834/9MAC2	--	E5710B WL630-41
L5	Exit – pair of doors, with lock, Rim device active leaf, exterior lever at active leaf; vertical rod exit device inactive leaf, no exterior trim; meeting astragal.	F08 x F08	8877 777-8 ETL x 8710	ED5200 x 9834/9MAC2 X ED 5400 N9M55	--	E5710BWL6 30-41/8888 x 8710 (Sargent exit devices or other compatible)
L6	Exit – single door, no lock, exterior lever	F14	12-8915 x 715 ETL	ED5200 x 9834/9MAC2	9500 x YC23M	Sargent 12-8915 x 715 ETL
L7	Exit – pair of doors, no lock, exterior lever. Rim device active leaf; vertical rod exit device inactive leaf, no exterior trim; meeting astragal.	F14 x F14	8902 x ETL 8702 x ETL	ED5200 x 9834/9MAC2 X ED5400 N9M55	9500 x YC23M 9500 x YC23_	Sargent 12-8915 x 715 ETL
L8	Pair of doors, dormitory lock on active leaf, manual flush bolts on inactive leaf. Provide dummy trim on inactive	F013				

3. Provide push bar fire exit hardware for labeled doors and panic hardware for non-labeled doors. Locks and latches to be mortise type. UL classify exit devices.
4. US32D finish.
5. For locking hardware, provide six-pin interchangeable core lock cylinders to accept cores compatible with Owner's existing master key system.
6. Lock trim shall be through bolted through the lock case to assure correct alignment and proper operation.
7. All locks, trim, and cylinders shall be from one manufacturer.
8. Aluminum (interior) vestibule doors shall be push-pull only using manufacturer's standard clear anodized devices.

- D. Door closers to be sized per manufacturer's recommendations for width of door. Parallel arm mounting with heavy duty hold-open arms at exterior, out-swinging doors. Use non-metallic, corrosion-resistant covers. Provide without hold-open on rated doors.

	Corbin Russwin	Sargent	Dorma
Series	DC6210	351	7400

1. Include brackets for closers at outswinging exterior doors.
2. Devices shall be equipped with adjustable back check valves to prevent door or closer from striking adjacent wall or equipment.

- E. Door Protection Plates - 0.050-inch stainless steel US32D plate, four sides beveled, 2 inches less than door width.

1. Stainless steel attachment hardware.

	Burns	Ives
Kickplate (10-inch high)	KP50	8400
Mop plate (4-inch high)	MP50	8400
Armor plate (42-inch high)	AP50	8400

- F. Astragal Weatherstripping – Clear anodized aluminum retainer with silicone seal. Surface mounted center meeting (pair).

National Guard Products, Inc.	Pemko
137SA	303CS

- G. Head and Jamb Weatherstripping – Clear anodized aluminum retainer with silicone seal.

National Guard Products, Inc.	Pemko
160SA	303SNS

H. Smoke and Draft Seals at Fire-Rated Doors

1. In-kerf seals at head and jamb equal to Smoke-Tech by CECO.
2. Where integral kerf is not provided, self-adhesive fire and smoke gasketing equal to S44 SiliconSeal by Pemko. Select color to match or blend with frame color.

I. Door Sweep – Stainless steel or aluminum retainer with neoprene seal: mounted on bottom of door in contact with threshold.

National Guard Products, Inc.	Pemko
198NA	321CN

J. Door Silencers - Resilient rubber, fitted into drilled hole on all non-rated interior doors; three at jambs of single doors and two at head for each leaf of double doors.

Ives	Rockwood
SR64	608

K. Door Stops - Locate for maximum swing, wall stop for masonry, floor stop for GWB or where wall mounting is not acceptable. Finish US26D (BHMA 626).

	Ives	Rockwood
Masonry application (wall)	WS401 CVX or WS401 CCV	402, 403
GWB (floor stop)	FS17	442

L. Flush Bolts – Where indicated on Drawings, provide extension flush bolts on inactive leaf of pairs of doors at top and bottom of door.

1. Top strike and dustproof foot strike.
2. Top bolts 12 inches long except at doors over 7 feet 6 inches high, where length provided shall permit operation from floor.
3. Top Bolts at High Hinged Transoms - Surface-mounted, chain-operated, spring return.
4. Or equal.

2.04. FASTENERS

- A. Fasteners shall be 316 stainless steel of proper types, sizes, and quantities. Provide all screws, special screws, bolts, special bolts, and other devices needed for proper application of hardware.

2.05. FINISHES

- A. All hardware to be stainless steel unless noted otherwise.

- B. Visible metal components are to be US32D wherever possible.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that doors and frames are ready to receive work and dimensions are as indicated on shop drawings and instructed by the manufacturer.

3.02. INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions, Steel Door Institute Standards, NFPA 80 for fire doors, and NFPA 101 for exit doors.
- B. Install hardware after doors and frames have been finished, including field painting/finishing if required.
- C. Use templates provided by hardware manufacturer.
- D. Hardware required for passage shall be mounted no higher than 48 inches above finished floor.
- E. Door protection plates shall be installed on the push side of doors.

3.03. ADJUSTING

- A. Adjust hardware for smooth operation.
- B. All door closer parameters shall be properly adjusted, including closing speed, latching speed, backcheck, and delayed action.

3.04. ACCEPTANCE OF WORK

- A. Following installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work.
- B. Demonstrate that permanent keys operate respective locks then turn over to Owner as specified in this specification.
- C. Demonstrate that door closers backcheck, delay, and close properly.
- D. Correct, repair, and finish, as directed, errors in cutting and fitting or damage to adjoining work.

3.05. PROTECTION OF FINISHED WORK

- A. Protect finished work from construction activity.
- B. Do not permit adjacent work to damage hardware or finish.

3.06. HARDWARE SETS

Hardware Set No.	Description	Threshold	Closer (one per leaf of pairs)	Door Protection Plate	Weatherstripping (Head, Jamb, Sill)	Astragal (with Weatherstrip)	Smoke and Draft Seals	Hinges	Panic Bar	Hold Open	Slide Bolt	Lockset, Latchset, or Exit Device
1	X, E, L, S	✓	✓	--	✓	--	--	✓	✓	✓	--	L3
2	X, E, L, S	✓	✓	✓	✓	--	✓	✓	✓	✓	--	L3
3	X, L, S	✓	✓	✓	✓	--	✓	✓	✓	✓	--	L1
4	X, L, S	✓	✓	✓	✓	--	✓	✓	✓	✓	--	L3
5	X, L, S	✓	✓	✓	✓	--	--	✓	✓	✓	--	L3
6	X, L, S	✓	✓	--	✓	--	--	✓	✓	✓	--	L3
7	X, L, P	✓	✓	✓	✓	✓	--	✓	✓	✓	✓	L3
8	I, F, L, P	--	✓	✓	--	✓	✓	✓	✓	✓	--	L1
9	I, E, F, S	--	✓	✓	--	--	✓	✓	✓	✓	--	L2
10	I, F, L, S	--	✓	✓	✓	--	✓	✓	--	--	--	L1
11	I, F, L, S	--	✓	✓	--	--	✓	✓	--	--	--	L1
12	I, L, S	--	✓	✓	--	--	--	✓	✓	✓	✓	L1
13	I, L, S	--	✓	✓	--	--	--	✓	✓	--	--	L1
14	I, E, F, S	--	✓	✓	--	--	✓	✓	✓	--	--	L1
15	I, L, P	--	✓	✓	--	✓	--	✓	✓	✓	✓	L1
16	I, F, S	--	--	--	--	--	✓	✓	--	--	✓	L2
17	I, P	--	--	--	--	--	--	✓	--	--	--	L4
18	I, L, S	--	--	--	--	--	--	✓	--	--	--	L1
19	I, L, S	--	--	--	--	--	--	✓	--	--	--	L5
20	I, S	--	--	--	--	--	--	✓	--	--	--	L4

Abbreviations:

I = Interior

E = Egress (panic) device

F = Fire rated

L = Lockable

P = Pair

S = Single

X = Exterior

END OF SECTION

SECTION 08911

FIXED LOUVERS

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Fixed extruded-aluminum louvers in gable end walls.

1.02. DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades.
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.03. SUBMITTALS

- A. Product Data: For each type of product.
 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Samples: For each type of metal finish required.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- D. Retain first paragraph below if windborne-debris-impact resistance is required.
- E. Sample Warranties: For manufacturer's special warranties.

1.04. QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.05. FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.06. WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.02. PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.
- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
- D. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.03. FIXED EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal Drainable-Blade Louver:
 - 1. Louver Depth: 4 inches.
 - 2. Frame and Blade Nominal Thickness: Not less than 0.080 inch for blades and 0.080 inch for frames.
 - 3. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.04. MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Galvanized-Steel Sheet: ASTM A653/A653M, G60 zinc coating, mill phosphatized.
- D. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.
 - 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 - 5. For color-finished louvers, use fasteners with heads that match color of louvers.
- E. Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.05. FABRICATION

- A. Factory assembled louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern where indicated.
 - 2. Horizontal Mullions: Provide horizontal mullions at joints.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.

2.06. ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range to match the color of the metal roof panels.

2.07. LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Insect screening.
- B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
- D. Insect Screening: Stainless steel, 18-by-18 mesh, 0.009-inch wire.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.03. INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

3.04. ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

A. Field preparation and painting of:

1. Surfaces and materials indicated to receive paint/coatings in the Room Finish Schedule, Tank Finishes Schedule, or Exterior Color and Finish Schedule on the architectural drawings.
2. Equipment, fabrications, and surfaces listed in Table A-2, Equipment Finish Schedule or where field preparation or painting is called for in the specification for that equipment or fabrication.
 - a. Any equipment, whether listed in Table A-2 or not, that is not provided by its manufacturer with surface preparation, prime coat, and finish coats suitable to protect the equipment for its service life in the environment where it is to be installed. If equipment manufacturer proposes their standard coating, they shall submit a certification as specified.
3. Pipes, fittings, valve bodies and other components of piping systems listed in Table A-3, Piping Color and Label Schedule.
 - a. In addition to all new piping, all existing interior piping to remain in buildings in which work is being performed shall be repainted and relabeled in accordance with the provisions listed herein.
4. All miscellaneous steel fabrications, steel stairs and structural steel. This includes galvanized steel where a paint/coating finish is called for in schedules, on Drawings, or in the specifications. Stainless steel is not to be coated except where specifically noted or scheduled.
5. Any equipment or fabrications where field preparation or painting is called for in the specification for that equipment or fabrication.
6. Any surface or object indicated as painted/coated in the Drawings.

B. Supply and installation of pipe labels per Table A-3, Piping Color and Label Schedule and Section 10426, Pipe Identification.

C. Work not to be painted/coated under this section includes:

1. Any surfaces not listed, specified, noted or scheduled to receive paint/coating as listed in paragraph 1.01.A.

2. Cast-in-place concrete surfaces scheduled, specified, or noted to receive other finishes specified in Sections 03350, Concrete Finishes, and 09851, Chemical-Resistant Finish (C.R.F.)
3. Clay masonry or concrete masonry unless specifically scheduled or called out.
4. Factory finished interior or exterior equipment, furnishings or materials except as listed in paragraph 1.01.A.
5. Safety labels, equipment tags, UL, or other standards compliance certification labels, or other features required to be visible to meet codes or regulations, or to facilitate equipment operation.

1.02. REFERENCES

ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D522	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings (Method A, Conical Mandrel)
ASTM D870	Standard Practice for Testing Water Resistance of Coatings Using Water Immersion
ASTM D1014	Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates
ASTM D1653	Moisture Vapor Transmission
ASTM D2794	Impact
ASTM D3363	Hardness
ASTM D4541	Adhesion (Type II Fixed Alignment Adhesion Tester)
ASTM D4541	Adhesion (Type V Self-Aligning Adhesion Tester)
ASTM D4585	Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation
ASTM D16	Standard Terminology for Paint-Related Coatings, Materials, and Applications
ASTM D4060	Abrasion Resistance (CS-17 Wheel, 1000 Grams Load)
ASTM D3359	Adhesion by Tape Test
ASTM G53	QUV Exposure (UVA-340 Bulbs, 4 Hours Light, 4 Hours Dark)
ASTM G85	Prohesion
NACE	NACE International (formerly “National Association of Corrosion Engineers”) – certification program
NSF International	ANSI/NSF Standard 61
SSPC-Volumes 1 and II	Steel Structures Painting Council - Steel Structures Painting Manual
SSPC-SP1	Solvent Cleaning

SSPC-SP2	Hand Tool Cleaning
SSPC-SP3	Power Tool Cleaning
SSPC-SP5	White Metal Blast Cleaning
SSPC-SP6	Commercial Blast Cleaning
SSPC-SP7	Brush-Off Blast Cleaning
SSPC-SP10	Near-White Metal Blast Cleaning
SSPC-SP11	Power Tool Cleaning to Bare Metal
SSPC-SP13 / NACE No. 6	Surface Preparation of Concrete
SSPC-SP16	Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
N.S.F. (National Sanitation Foundation)	

1.03. DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04. SUBMITTALS

- A. Painting experience record and qualifications of proposed subcontractor/Contractor. The subcontractor/Contractor shall have a minimum of five years' experience and provide references for at least three projects of similar size and type that have been successfully completed.
- B. Submit a complete schedule of paint/coating systems and surface preparations.
1. List all interior and exterior surfaces and all major equipment to be painted.
 2. The schedule is to reflect the approved manufacturer's recommendations. Schedule shall include certification that a qualified manufacturer's representative has reviewed and approved the schedule. The qualified manufacturer's representative shall hold current NACE certification as a Coating Inspector, Protective Coatings Specialist, or Materials Selection/Design Specialist.
 3. As a minimum, schedule shall itemize each painted item or surface and shall contain the following information in tabular format:
 - a. Type of surface preparation (note whether shop or field preparation).
 - b. Paint or coating system (generic name).
 - c. Prime coat (product, number of coats, dry mil thickness per coat, square feet coverage per gallon).
 - d. Intermediate coat, if required (product, number of coats, dry mil thickness per coat, square feet coverage per gallon).

- e. Finish coat (product, number of coats, color, dry mil thickness per coat, square feet coverage per gallon).
 - f. Painting/coating status at time of installation.
 - g. Remarks (any special treatment or application requirements, etc.)
- 4. The schedule shall follow the sample format attached to the end of this section. It shall also contain the name of the paint/coating manufacturer and name, address, and telephone number of the manufacturer's representative who will inspect the work. The schedule shall be in conformance with the criteria of Table A-1 and the schedules contained in the architectural drawings. Manufacturer's recommended dry mil thickness shall be incorporated into the schedule. Schedule shall be submitted to the Engineer as soon as possible following the award of Contract so that the approved schedule may be used to identify colors and to specify shop paint/coating systems for fabricated equipment.
- 5. Contractor shall provide a tabulation of equipment manufacturer's preparation and coating system with remarks specifying which equipment coatings meet the requirements specified herein and which equipment requires field painting.
- 6. Where applicable, submit a certification from the equipment manufacturer if they propose to utilize their standard coating system. Certification shall provide the following:
 - a. Tabular comparison of the specified coating system and the manufacturer's proposed coating system, including, at a minimum; coating manufacturer, coating material, number of coats, thickness by coat, and as specified in the painting schedule.
 - b. Statement that manufacturer has reviewed the Contract Documents and is providing a coating system for the environmental exposure and service of their equipment.
 - c. Statement that coating system meets or exceeds requirements as specified in this specification section.
 - d. Statement that application of manufacturer's coating system does not affect the manufacturer's equipment warranty.
 - e. Statement that if manufacturer's coating system is determined to be defective or fails, manufacturer will investigate and provide the required materials, labor, and shipping to repair or recoat the equipment at no additional cost to the Owner.
- C. Submit color chips for selection. Color names and/or numbers shall be identified according to the appropriate color chart published by the manufacturer.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Provide paint, stain, varnish, coating, and other products identified in this Section by the manufacturers shown in Table A-1. The naming of a manufacturer for one paint/coating system in Table A-1 (example: M-3) is not be construed as approval of that manufacturer for other systems. Listed manufacturers include:
 - 1. Sherwin-Williams
 - 2. PPG
 - 3. Tnemec
- B. Equivalent materials of other manufacturers may be substituted only by approval of Engineer.

Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information, solids by volume, and coverage rate or recommended dry film thicknesses.

 - 1. Requests for substitution shall also include a list of five projects where each product has been used and rendered satisfactory service; which list shall include the following information:
 - a. Name and location of the project.
 - b. A contact (name and telephone number) at the project who is in a position to be aware of the performance of the proposed coatings; typically the maintenance director or superintendent of buildings and grounds.
 - c. Information about which coatings were used on which surfaces at the referenced project.
 - 2. No request for substitution shall be considered that does not provide equal or better performance than the specified products. Provide manufacturer's certified test reports of characteristics relevant to the proposed product installation, showing that substitute product(s) equal or exceed performance of specified products as tested according to the standards listed below, or tests of equal relevance and severity:
 - a. ASTM D5894 – Corrosion Weathering (cycle testing).
 - b. ASTM D522 - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings (Method A, Conical Mandrel).
 - c. ASTM D870 - Standard Practice for Testing Water Resistance of Coatings Using Water Immersion.
 - d. ASTM D1014 - Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates.
 - e. ASTM D4060 - Abrasion Resistance: CS17 wheel, 1000 cycles, 1 kg load.

- f. ASTM D4541 - Abrasion Resistance.
 - g. ASTM D5894 – Adhesion.
 - h. ASTM D4585 – Humidity Resistance.
- C. Products for each specified function and system shall be of a single manufacturer.
- D. Where thinning is necessary, only the products of the particular manufacturer furnishing the paint/coating shall be used, and all such thinning shall be done in strict accordance with the manufacturer's instructions.

2.02. MATERIAL

- A. For all coatings, refer to Table A-1, Coating System Schedule.
- B. All materials which will be in contact with potable water shall be approved by the National Sanitation Foundation and appropriate state and local health departments. Contractor shall submit evidence of approval for all applicable materials.
- C. All materials used on this project, whether shop applied by equipment manufacturer or field applied by Contractor, shall comply with all current federal, state and local Clean Air Act-related regulations. It shall be the responsibility of equipment manufacturers to comply with laws in effect at their painting/coating facilities. Where laws or regulations prohibit field applications of any scheduled paint /coating product, Contractor shall submit for Engineer's approval, an alternate product of similar performance characteristics which complies with those laws. If approved, those products shall be provided at no additional cost to the Owner.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that substrate conditions are ready to receive work as instructed by the product manufacturer and in accordance with the approved schedule of paint/coating systems and surface preparations.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Correct any condition that may potentially affect proper application.

3.02. SURFACE PREPARATION

- A. Prepare surfaces in accordance with the direction and referenced standards shown in Table A-1.
- B. If, for any reason, Contractor deems the surface preparation shown in Table A-1 to be inappropriate for a specific surface or location; Contractor to submit a proposed alternative preparation, in the form of a signed recommendation by the manufacturer's NACE-certified representative for Engineer's approval.

3.03. APPLICATION

- A. Contractor shall be responsible for cleanliness of all painting/coating operations and use covers and masking tape to protect work. Contractor shall protect not only his own work, but also all adjacent work and materials by adequate covering with drop cloths.
- B. Contractor shall maintain a daily epoxy coatings induction record (log) showing each epoxy coating mixing event in the format demonstrated at the end of this section. A signed copy of this log shall be turned over to the Engineer's field representative before the end of each working day during which epoxy coatings are mixed or applied.
- C. Any unwanted coating shall be carefully removed without damage to finished coating or surface. If damage does occur, the entire surface adjacent to and including damaged area shall be recoated without visible lap marks.
- D. Do not use plumbing fixtures or waste piping for mixing of paint/coatings or disposal of any refuse material. All waste shall be disposed of properly into a suitable receptacle located outside of building.
- E. All coatings shall be applied without runs, sags, thin spots, or unacceptable marks. Coatings shall be applied at the rate specified to achieve minimum dry mil thickness required. Additional layers of coating shall be applied, if necessary, to obtain dry film thickness specified.
- F. Application shall be by spraying where recommended by manufacturer. If material has thickened or must be diluted for application by spray gun, each coat shall be built up to the same film thickness achieved with undiluted brushed-on material. Where thinning is necessary, such thinning shall be done in strict accordance with manufacturer's instructions.
- G. A minimum of 24 hours drying time shall elapse between application of any two layers of coating on a particular surface, unless otherwise recommended by coating manufacturer. Longer drying times may be required for abnormal conditions in concert with manufacturer's recommendations.
- H. No coating whatsoever shall be accomplished in rainy or excessively damp weather when the relative humidity exceeds 85 percent, or when the general air temperature cannot be maintained at 50 degrees F (10 degrees C) or above throughout entire drying period.
- I. Apply color coding to all new piping, in accordance with Piping Color and Label Schedule in Section 10426, Pipe Identification, and/or Engineer's instructions. Piping shall be painted solid colors unless otherwise specified. Coordinate with requirements of Section 10426, Pipe Identification.

3.04. FINISHING SHOP PRIMED EQUIPMENT

- A. All fabricated steel work and equipment scheduled to be delivered to job site shop primed, and scheduled for field finish painting/coating, shall receive at factory at least one shop layer of approved prime paint/coating compatible to be applied in concert with paint system required by these Specifications. Surface preparation prior to shop painting shall be as scheduled in Table A-1. All shop primed items shall be properly packaged and stored until

they are incorporated in work. Any primed surfaces that are damaged during handling, transportation, storage, or installation shall be cleaned, scraped, and patched before field painting/coating begins so that work shall be equal to original painting/coating at shop. Equipment or steel work that is to be assembled on the site shall likewise receive a minimum of one shop layer of paint/coating at factory. Paint and surface preparation used for shop coating shall be identified on equipment shop drawings submitted to Engineer.

- B. Where exact identity of shop primer cannot be determined, or where primer differs from that specified, Contractor shall perform blast cleaning appropriate for service, followed by specified paint/coating system. In lieu of above, Contractor has the option of shipping bare metal to job site and performing appropriate blast cleaning, followed by field prime of specified material immediately thereafter.

3.05. FIELD QUALITY CONTROL

- A. Prior to receiving a Certificate of Substantial Completion, Contractor shall arrange for manufacturer to inspect the application of his product and shall submit his report to Engineer identifying products used and verifying that said products were properly applied and that paint/coating systems were proper for the exposure and service. The manufacturer's representative shall also certify that all coats in each system are compatible with one another.
- B. The Contractor shall follow a system of tinting successive paint/coating layers so that no two coats for a given surface are exactly the same color. Areas to receive black protective coatings shall be tick-marked with white or actually gaged as to thickness when finished.

3.06. LEAD PAINT

- A. The Contractor is notified that lead paint has been found in painting systems at the subject work site. See the reports referenced in the Supplementary Conditions (SC-4.06).

3.07. SHOP PAINTING

- A. Shop painting/coating of manufactured items (such as lockers, furnishings, and electrical and mechanical equipment) is not included in the scope of this work, unless specifically scheduled; as in the case of fabricated steel items (steel stairs, structural and miscellaneous steel), steel doors and frames). Manufactured items shall be finished as noted in the specification section related to that item.

(continued)

TABLE A-1
COATING SYSTEM SCHEDULE

Non-Submerged Concrete Walls and Ceilings – Interior

System C-1	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with ASTM D4258			Allow concrete to cure 28 days prior to beginning coating operations
Prime Coat	--	--	--	--
Intermediate Coat	Macropoxy 646 3.5-5.0 mils/coat	Amerlock 2/400	Series 66HS 2.0-5.0 mils/coat	--
Finish Coat	Macropoxy 646 3.5-5.0 mils/coat	Amerlock 2/400	Series 66HS 2.0-5.0 mils/coat	Total DFT – 8. mils, minimum

Concrete in Contact with Sewage (paint/coat only when scheduled in Table A-2 or on the architectural drawings)

System C-2	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP 13 Surface preparation of concrete			Allow concrete to cure 28 days prior to beginning coating operations
Prime Coat	Macropoxy 646 3.5-5.0 mils/coat	Amerlock 2/400	Series 218 at 1/16" - 1/4"	--
Intermediate Coat	--	--	--	--
Finish Coat	TARGUARD Coal Tar Epoxy	Amercoat 78HB	Series G435 at 60-80 mils	Top of wall to 3 feet below water line. Total DFT-80 mils minimum

Concrete Block, Open Porous or Rough Masonry - Interior

System C-3	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with ASTM D4261			Allow mortar joints to cure 28 days prior to beginning coating operations
Prime Coat	Cement-Plex 875 Acrylic Block Filler	Amerlock 400 BF	130-6602 Enviro-Fill 100-120 sf/gal	Fill all voids.
Intermediate Coat	Macropoxy 646 3.0-5.0 mils	Amerlock 2/400	Series 66HS 4.0-5.0 mils/coat	--
Finish Coat	Macropoxy 646 3.0-5.0 mils	Amerlock 2/400	Series 66HS 4.0-5.0 mils/coat	Total DFT – 16 mils minimum

TABLE A-1 (continued)

Concrete - Exterior (paint/coat only when scheduled in Table A-2 or on the architectural drawings)

System C-4	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with ASTM D4258			Allow concrete to cure 28 days prior to beginning coating operations
Prime Coat	ConFlex XL Textured High Build Coating A05W00800	Perma-Crete Matte Flex 4-310 Series	Series 157-Color Enviro-crete 111-148 sf/gal	--
Intermediate Coat	--	--	--	--
Finish Coat	ConFlex XL Textured High Build Coating A05W00800	Perma-Crete Matte –Flex 4-310 Series	Series 157-Color Enviro-crete 111-148 sf/gal	Total DFT – 12 mils minimum

Concrete in Contact with Raw or Potable Water (paint/coat only when scheduled in Table A-2 or on the architectural drawings)

System C-5	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP 13 Surface preparation of concrete			Allow concrete to cure 28 days prior to beginning coating operations
Prime Coat	Macropoxy 646 PW Epoxy B58Wx610 – Mill White B58Wx600 – Light Blue B58VX600 – Hardener B58VX605 (3-coats, total DFT – 14 mils minimum)	Amerlock 2	Series 218 at 1/16” – 1/4”	Fill all voids.
Intermediate Coat		Amerlock 2	--	--
Finish Coat		Amerlock 2	Series 22/FC22 at 20-30 mils DFT	Total DFT – 30 mils minimum

Non-Submerged Masonry Walls – Glazed Wall Finish - Interior

System C-6	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with ASTM D4261			Allow concrete to cure 28 days prior to beginning coating operations
Prime Coat	Macropoxy 646 Fast Cure Epoxy	Amerlock 2/400	Series 27WB at 3.0-5.0 mils DFT	--
Intermediate Coat	--	--	--	--
Finish Coat	Macropoxy 646 Fast Cure Epoxy	Amerlock 2/400	Series 27WB at 3.0-5.0 mils DFT	Total DFT – 16 mils minimum

TABLE A-1 (continued)

Non-Submerged Ferrous Metal

System M-1	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	SSPC-SP6/NACE 3 Commercial Blast Cleaning			Shop
Prime Coat	Pro Industrial ProCryl	Pitt Tech Plus 1300 Series	Series 1 2.0-3.5 mils	Shop
Intermediate Coat	Sher-Cryl HPA-High Performance Acrylic B66W00350	Pitt Tech Plus 1300 Series	Series 1029-Color Enduratone, 2.0-3.0 mils	--
Finish Coat	Macropoxy 646 Fast Cure Epoxy B58W00610	Pitt Tech Plus 1300 Series	Series 1029-Color Enduratone, 2.0-3.0 mils	Total DFT – 7.5 mils minimum

General Ferrous Metal - Interior

System M-2	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	SSPC-SP6/NACE 3 Commercial Blast Cleaning			Shop
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 1 2.5-3.0 mils	Shop
Intermediate Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	--
Finish Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	Total DFT – 12 mils minimum

Submerged Ferrous Metal

System M-3	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP10/NACE 2 Near White Metal Blast Cleaning			--
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 1 2.5-3.0 mils	Shop
Intermediate Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	--
Finish Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	Total DFT – 12 mils minimum

TABLE A-1 (continued)

General Ferrous Metal - Exterior

System M-4	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	SSPC-SP6/NACE 3 Commercial Blast Cleaning			Shop
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 1 2.5-3.0 mils	Shop
Intermediate Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	--
Finish Coat	Hi-Solids Polyurethane 250 Polyurethane Semi-Gloss	Amercoat 450H	Series 1095-Color Endura-Shield 3.0-5.0 mils	Total DFT – 10.5 mils minimum

Ferrous Metal – Below Grade

System M-5	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP10/NACE 2 Near White Metal Blast Cleaning			--
Prime Coat	--	--	--	--
Intermediate Coat	--	--	--	--
Finish Coat	TARGUARD Coal Tar Epoxy	Amercoat 78HB	46H-413 Hi-Build Tneme-Tar 16.0-20.0 mils	Total DFT – 16.0 mils minimum

Ferrous Metal Moving Parts Submerged in Sewage

System M-6	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP10/NACE 2 Near White Metal Blast Cleaning			Shop
Prime Coat	Macropoxy 646	Amercoat 240	Series 66HS 3.0-5.0 mils	--
Intermediate Coat	--	--	--	--
Finish Coat	--	--	--	Total DFT – 4 mils, minimum

TABLE A-1 (continued)

Ferrous Metal Submerged in Raw or Potable Water

System M-7	Sherwin-Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP10/NACE 2 Near White Metal Blast Cleaning			--
Prime Coat	Macropoxy 646 PW Epoxy B58LX610 – Mill White B58VX600 – Light Blue B58VX600 – Hardener B58VX605-OAP Hardener	Amerlock 2	Series 1 2.5-3.0 mils	--
Intermediate Coat	Macropoxy 646 PW as above	Amerlock 2	--	--
Finish Coat	Macropoxy 646 PW as above	Amerlock 2	Series 22/FC22 at 30-40 mils DFT	Total DFT – 32.5 mils, minimum

Uncertain Base Coat

System M-8	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	Wash with Great Lakes No-Rinse Pre-Paint Cleaner and water, rinse thoroughly with clean water and allow to dry.			
Prime Coat	Macropoxy 5000	Amercoat 68MCZ	Series 1 2.5-3.5 mils	
Intermediate Coat	--	--	--	Follow with appropriate system for exposure (minus the normal specified primer).
Finish Coat	--	--	--	--

Aluminum Surfaces in Contact with Concrete

System M-9	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP16 Brush-off Blast cleaning of coated and uncoated galvanized steel, stainless steel and non-ferrous metals.			--
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	--.
Intermediate Coat	--	--	--	--
Finish Coat	--	--	--	Total DFT – 5.0 mils minimum

TABLE A-1 (continued)

Interior Insulated Piping

System M-10	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	Clean and dry			--
Prime Coat	DTM Acrylic Primer/Finish B66W00001	Pitt Tech Plus 1300 Series	1026-Color Tnemec-Cryl 2.0-3.0 mils	--
Intermediate Coat	--	--	--	--
Finish Coat	DTM Acrylic Primer/Finish B66W00001	Pitt Tech Plus 1300 Series	1026-Color Tnemec-Cryl 2.0-3.0 mils	Total DFT – 5.0 mils minimum

Non-Submerged Ferrous Metal – Extra Corrosion Protection - Exterior

System M-11	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP6/NACE 3 Commercial Blast Cleaning			Shop
Prime Coat	Corothane 1 Gal-Va-Pac Zinc Primer B65G00010	Amercoat 68MCZ	Series 1 2.5-3.0 mils	Shop
Intermediate Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	--
Finish Coat	Hi-Solids Polyurethane 250 Polyurethane Semi-Gloss	Amercoat 450H	Series 1095 Endurashield 2.5-3.0 mils	Total DFT – 9.5 mils minimum

Nonferrous Metal - Interior

System M-12	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP16 Brush-off Blast cleaning of coated and uncoated galvanized steel, stainless steel and non-ferrous metals.			--
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 2.0-3.0 mils	--
Intermediate Coat	--	--	--	--
Finish Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 2.0-3.0 mils	Total DFT – 6.0 mils minimum

TABLE A-1 (continued)

Nonferrous Metal - Exterior

System M-13	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP16 Brush-off Blast cleaning of coated and uncoated galvanized steel, stainless steel and non-ferrous metals.			--
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 2.0-3.0 mils	--
Intermediate Coat	--	--	--	--
Finish Coat	Hi-Solids Polyurethane 250 Polyurethane	Amercoat 450H	Series 1095 Endurashield 2.5-3.0 mils	Total DFT – 6.0 mils minimum

Galvanized Steel - Exterior

System M-14	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP16 Brush-off Blast cleaning of coated and uncoated galvanized steel, stainless steel and non-ferrous metals.			--
Prime Coat	Corothane 1 Gal-Va-Pac Zinc Primer	Amercoat 68MCZ	Series 66HS 3.0 mils	--
Intermediate Coat	Macropoxy 646	Amerlock 2/400	Series 1095 3.0-4.0 mils	Total DFT – 6.0 mils minimum

Galvanized Steel - Interior

System M-15	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP16 Brush-off Blast cleaning of coated and uncoated galvanized steel, stainless steel and non-ferrous metals.			--
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	--
Intermediate Coat	--	--	--	--
Finish Coat	Macropoxy 646	Amerlock 2/400	Series 66HS 3.0-5.0 mils	Total DFT – 8.0 mils minimum

TABLE A-1 (continued)

East River Street Pump Station Steel Wet Well

System M-16	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	In accordance with SSPC-SP10 Near White Metal Standard, pressure wash and abrasive blast clean. Surface clean and dry.			--
Prime Coat	--	--	Series G435 30.0-40.0 mils	--
Intermediate Coat	--	--	--	--
Finish Coat	--	--	Series G435 30.0-40.0 mils	Total DFT – 60.0 mils minimum

Gypsum Board or Plaster Walls, Ceilings and Soffits – Interior

System G-1	Sherwin Williams	PPG	Behr	Remarks
Surface Preparation	Clean and dry			--
Prime Coat	ProMar 200 Zero VOC 100% Acrylic Primer	Pure Performance 9-900 Interior Latex Primer	Premium Plus Interior Semi- Gloss Enamel	--
Intermediate Coat	DTM Acrylic Coating – Semi- Gloss	SPEEDHIDE 6-8510 Series 100% Acrylic – Semi-Gloss	Premium Plus Interior Semi- Gloss Enamel	--
Finish Coat	DTM Acrylic Coating – Semi- Gloss	SPEEDHIDE 6-8510 Series 100% Acrylic – Semi-Gloss	Premium Plus Interior Semi- Gloss Enamel	Total DFT – 6.0 mils minimum

Gypsum Board Walls, Ceilings, and Soffits. High Performance - Interior

System G-2	Sherwin Williams	PPG	Tnemec	Remarks
Surface Preparation	Clean and Dry			--
Prime Coat	Macropoxy 646	Amerlock 2/400	Series 1029 2.0-3.0 mils	--
Intermediate Coat	--	--	--	--
Finish Coat	Macropoxy 646	Amerlock 2/400	Series 1029 2.0-3.0 mils	Total DFT – 5.0 mils minimum

TABLE A-1 (continued)

Natural Wood - Interior

System W-1	General Finishes	PPG	Minwax	Remarks
Surface Preparation	Clean and Dry			--
Prime Coat	Enduro Ready to Match (RTM) Water Based Stain	Deft Wood Stain Interior – Oil-Modified, Water Based DFT300 Series	Water Based Pre-Stain Wood Conditioner followed by Water Based Wood Stain	--
Intermediate Coat	Enduro-Var Water Based Urethane - Satin	Deft Clear Wood Finish Interior Water Based Acrylic – Satin DFT109	Polycrylic Protective Finish - Satin	--
Finish Coat	Enduro-Var Water Based Urethane - Satin	Deft Clear Wood Finish Interior Water Based Acrylic – Satin DFT109	Polycrylic Protective Finish - Satin	--

Wood – Acrylic/Alkyd Stain – Exterior Semi-Transparent

System W-2	Sherwin Williams	PPG	Pratt & Lambert	Remarks
Surface Preparation	Clean and Dry			--
Prime Coat	WoodScapes Exterior Polyurethane Semi-Transparent Stain A15T	Sun Proof Acrylic/Oil Semi-Transparent Stain 77-1460	StainShield Semi-Transparent Waterborne Deck & Siding Stain Z1497	--
Intermediate Coat	--	--	--	--
Finish Coat	WoodScapes Exterior Polyurethane Semi-Transparent Stain A15T	Sun Proof Acrylic/Oil Semi-Transparent Stain 77-1460	StainShield Semi-Transparent Waterborne Deck & Siding Stain Z1497	--

Wood – Acrylic Stain – Exterior Solid Color

System W-3	Sherwin Williams	PPG	Pratt & Lambert	Remarks
Surface Preparation	Clean and Dry			--
Prime Coat	WoodScapes Exterior Acrylic Solid Color Stain A15 Series	Sun Proof 100% Acrylic Latex Solid Color Stain 77-1110	Stainshield Solid Hide Latex Siding Stain Z1490	--
Intermediate Coat	--	--	--	--
Finish Coat	WoodScapes Exterior Acrylic Solid Color Stain A15 Series	Sun Proof 100% Acrylic Latex Solid Color Stain 77-1110	Stainshield Solid Hide Latex Siding Stain Z1490	--

TABLE A-1 (continued)

Wood – Painted – Exterior

System W-4	Sherwin Williams	PPG	Pratt & Lambert	Remarks
Surface Preparation	Clean and Dry			--
Prime Coat	Exterior Oil-based Wood Primer Y24W8020	Seal Grip 17-921 Series	Multi-Purpose Waterborne Primer P1003	--
Intermediate Coat	A-100 Exterior Latex Satin A82-100 Series	Weather King Exterior 100% Acrylic, Lo-Luster, DRW66891XI Series	Accolade Exterior Waterborne – Eggshell RZ4200	--
Finish Coat	A-100 Exterior Latex Satin A82-100 Series	Weather King Exterior 100% Acrylic, Lo-Luster, DRW66891XI Series	Accolade Exterior Waterborne – Eggshell RZ4200	--

TABLE A-2

EQUIPMENT FINISH SCHEDULE

Building or Area	Equipment	Paint/Coating System	Color

NOTE: Table A-1 and the Equipment Finish Schedule (Table A-2) are not intended to list every structure or equipment item to be painted.

TABLE A-3

PIPING COLOR AND LABEL SCHEDULE

Legend	Piping Nos. From Drawings	Label Color	Pipe Color⁽¹⁾

Color Code:

GR = Gray with black letters
 B = Blue with white lettering
 LB = Light blue with white lettering
 DB = Dark blue with white lettering
 G = Green with white letters
 LG = Light green with black letters
 Y = Yellow with black letters
 BK = Black with white letters
 R = Red with white letters
 BR = Brown with white letters
 BK = Black with white letters
 OR = Orange with white lettering
 P = Purple with white lettering

Notes:

1. Pipe color and labels shall be in accordance with the NYS Fuel Gas Code.
2. Paint/coat all metal electrical conduits to match background. Do not paint/coat PVC or PVC-coated conduit.
3. Do not paint/coat aboveground stainless steel, copper, FRP, or PVC pipe. Provide pipe labels only.
4. This table may not list every pipe to be painted/coated or labeled. All ferrous piping and conduit shall be painted/coated.
5. All piping shall be painted except as noted above.
6. Pipe identification including labels and arrows shall be in accordance with Section 10426, Pipe Identification.
7. Where pipe is insulated, provide color bands and pipe labels on insulation.
8. Where applicable pipe color and label color shall match existing conditions. If there is a discrepancy between the existing pipe colors and scheduled colors, coordinate color with Owner and Engineer

DAILY EPOXY COATINGS INDUCTION RECORD

Date	Product	Location	Ambient Temperature (°F)	Mix Start Time	Induction End Time	Total Induction Time Before Use

END OF SECTION

SECTION 09920

NON-SLIP EPOXY COATING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install a multi-coat seamless flooring system and all required accessories. The system is to be applied to new concrete slabs on grade in locations per Room Finish Schedule. The system includes, but is not limited to the following:
 - 1. Moisture vapor transmission testing. Corrective treatment if required to create proper application conditions.
 - 2. Surface preparation and cleaning, including abrasive blasting.
 - 3. VOC compliant epoxy primer and sealer.
 - 4. VOC compliant polyaspartic or polyamine epoxy top coating, applied in two coats, with embedded broadcast silica sand to achieve a slip-resistant surface.
 - 5. VOC compliant aliphatic urethane top coat in areas of two colors.
 - 6. Graphics, including stripes and lettering, of the same urethane material as the top coats, in a third and contrasting color, applied to the topcoat.
 - 7. Joint treatments at control joints, floor/wall intersections and other interruptions in slab surface.
- B. Mock-up location shall be of size and complexity as directed in Article 1.04 of this section.

1.02. REFERENCES

- A. ASTM D4258 – Standard Practice for Surface Cleaning Concrete for Coating.
- B. ASTM D4259 – Standard Practice for Abrading Concrete.
- C. ASTM D4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- D. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM F1679 – Standard Test Method for Using a Variable Incidence Tribometer (VIT).
- F. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- G. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

- H. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
- I. SSPC-SP13/NACE 6 – Concrete.

1.03. SUBMITTALS

- A. Initial Submittal – Provide all initial submittal information concurrently under a single submittal number, and in accordance with Section 01300, Submittals. Submittals shall include, but not be limited to, the following:
 - 1. Product Data - Provide data on specified products, including test results demonstrating compliance with specified requirements. Include product literature for all accessory materials.
 - 2. Color Chart - Submit color charts showing the manufacturer's full range of available colors for top coat materials.
 - 3. Manufacturer's Installation Instructions - Indicate special procedures if required for this specific installation.
 - 4. Shop Drawings – Provide large scale details showing control joints, expansion joints, terminations at floor drains, transitions to adjacent floor materials, and cove base details for floating slabs at exterior frost walls and for slabs passing under steel stud framed walls with gypsum wallboard. Show specific details of adjacent construction for this project.
 - 5. Maintenance Data - Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.
 - 6. Installer's Qualifications – Provide a letter from the finish system manufacturer verifying that the installing Contractor's personnel have been trained by the manufacturer in the installation of the specified system, or a system with similar installation requirements; and stating the manufacturer's approval of the installing Contractor for this work.
- B. Preconstruction Submittals – After approval of the specified products and selection of colors; provide the following submittals:
 - 1. Floor Finish and Graphics Mock-Up – To demonstrate workmanship and uniformity of coating thickness, install entire system, including color changes and stripes, to the floor as directed by the Engineer. Apply the field color for a distance of 4 feet out from the west, north and east walls of the room; and the walkway color in the remaining center area up to the edge of the slab under the door threshold. Add a 6-inch wide stripe in the contrasting graphics color centered over the boundary between field and walkway colors. Stencil two lines of 6-inch tall letters, centered in the walkway area with the bottom edge of lettering parallel to the door threshold. The top line is to read "WALKWAY;" the bottom line is to read "DO NOT OBSTRUCT."

If the mock-up work is sufficiently uniform and precise to satisfy the Engineer; it may remain part of the work. If not satisfactory, the finish in this area must be partially or wholly removed and reinstalled until it provides a satisfactory example of the standard expected for the locations scheduled to receive this finish.

2. Slabs scheduled to receive the epoxy floor finish are to be tested for humidity within the slab and moisture vapor transmission. After the building has been fully enclosed and HVAC systems have been in operation at occupied settings for a minimum of seven days; and prior to abrasive blasting and cleaning; humidity and moisture vapor transmission tests are to be taken. Data for ASTM D4263, ASTM F1869, and ASTM F2170 tests are to be recorded and copies submitted to the floor finish manufacturer's representative and to the Engineer.
3. Letter from the floor finish manufacturer's representative stating that s/he has reviewed the humidity and moisture vapor transmission reports, and has inspected the surface preparation for the floor finish, and certifies that these reports and observations indicate conditions that are compliant with the manufacturer's recommended conditions.

1.04. QUALIFICATIONS

- A. Manufacturer's Representative – Individual qualified to inspect surface preparation conditions and assess the suitability of environmental conditions for successful application of the specified system. The individual must also be empowered to approve the granting of a warranty for the completed work.

1.05. REGULATORY REQUIREMENTS

- A. Floor finish shall be classified under NFPA 253 as either Class I or Class II.
- B. Conform to COMAR 26.11.33 including the VOC content limits listed under 26.11.33.05.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Store finish component materials in a dry, secure area.
- B. Maintain a minimum temperature of 55 degrees F.
- C. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.07. ENVIRONMENTAL REQUIREMENTS

- A. Do not install finish system unless substrate surface temperature, substrate moisture content, and air temperature and humidity are all within the recommended ranges specified by the system manufacturer.
- B. Maintain curing conditions as recommended by the system manufacturer.

1.08. WARRANTY

- A. Provide one-year warranty.

- B. Warranty - Include coverage against flooring delamination from substrate and degradation of surface finish.

1.09. EXTRA MATERIALS

- A. Provide 2 gallons of flooring material of each color selected.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Entire system is to be supplied by a single manufacturer.
- B. Acceptable manufacturers:
 - 1. Carboline Company, St. Louis, MO
 - 2. Tnemec Company Incorporated, Kansas City, MO
 - 3. Blome International, O'Fallon, MO
 - 4. Other manufacturer with product of same generic type and equal performance, as determined by Engineer

2.02. SYSTEMS

- A. Power-Tread Series 237 by Tnemec, consisting of:
 - 1. Primer – Surfacing Epoxy Series 215 – Modified Polyamine Epoxy filler and primer.
 - 2. Power-Tread Series 237 Base Coat – Modified polyamine epoxy.
 - 3. Silica Aggregate – Applied between base and intermediate coats to attain a slip-resistant texture to the floor finish.
 - 4. Power-Tread Series 237 Intermediate Coat – Modified polyamine epoxy.
 - 5. Everthane Series 248 – Aliphatic moisture cured urethane, applied in two colors: one designated as the “field” color; the other designated as the “walkway” color.
 - 6. Everthane Series 248 – Aliphatic moisture cured urethane, applied in a third, contrasting color for stripe and letter graphics.
- B. Sanitile 985 PA by Carboline, consisting of:
 - 1. Primer – Carboguard 1340 WB waterborne epoxy filler and primer.
 - 2. Sanitile 985 PA Base Coat – High-solids polyaspartic.
 - 3. Silica Aggregate – Applied between base and intermediate coats to attain a slip-resistant texture to the floor finish.

4. Sanitile 985 PA Intermediate Coat – High-solids polyaspartic.
 5. Carbothane 134 VOC – Aliphatic acrylic polyurethane, applied in two colors: one designated as the field color; the other designated as the walkway color.
 6. Carbothane 134 VOC – Aliphatic acrylic polyurethane, applied in a third, contrasting color for stripe and letter graphics.
- C. System by another manufacturer that:
1. Is of the same generic type.
 2. Conforms to the performance requirements of this section.
 3. Is approved by the Engineer as an equal.

2.03. ACCESSORIES

- A. Vapor Blocking Mortar or Liquid Vapor Retarder
1. To be used only if required to meet the installation requirements for humidity and moisture vapor transmission of the substrate.
 2. Type recommended by the finish system manufacturer for the particular project conditions.
- B. Installation Accessories for Control Joints, Movement Joints and Cove Base
1. As recommended by the system manufacturer and shown on approved shop drawings.
 2. Include as needed: joint sealants, compressible backers, reinforcing fabrics and edge termination sealants or trim.
 3. Special installation tools recommended by the system manufacturer.

2.04. COLORS

- A. Primer – Manufacturer’s standard color.
- B. Base Coat or Undercoat – Light, neutral color that contrasts with top or sealer coat so that coverage may be visually verified.
- C. Top Coat
1. Field Area – Medium gray such as Carboline Sanitile 985 PA color C703.
 2. Walkway Area – Medium red such as Carboline Sanitile 985 PA color 0516.
 3. Stripes and Lettering – Light color that contrasts with Field and Walkway colors, such as Carboline Sanitile 985 PA color 9225.

2.05. BASE

- A. Primer – Manufacturer’s standard color.
- B. Base Coat or Undercoat – Light, neutral color that contrasts with top or sealer coat so that coverage may be visually verified.
- C. Base Details
 - 1. Cant cove where floor slab abuts or passes under concrete block or drywall partitions, 6 inches tall.
 - 2. Compatible urethane sealant over compressible filler where floating slab terminates adjacent to exterior walls.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 feet and are ready to receive work.
- B. Verify concrete floors have cured a minimum 28 days, meet manufacturer’s recommendations for humidity and moisture vapor transmission, and exhibit negative alkalinity, carbonization, or dusting.
- C. If moisture testing exceeds manufacturer’s limits, install manufacturer approved vapor barrier such as vapor blocking mortar. Verify that slabs with barrier meet manufacturer’s recommended limits.
- D. Verify floor is free of substances that may impair adhesion of new adhesive and finish materials.

3.02. PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Shot blast or mechanically abrade (scarify) to remove laitance, curing compounds, sealers, and other contaminants, and provide required surface profile per flooring manufacturer.
- C. Vacuum clean substrate.
- D. Conformance to ASTM D4258 and ASTM D4259, or SSPC-SP13/NACE 6, is the minimum acceptable level of preparation.

3.03. INSTALLATION - FLOORING

- A. Before starting installation: verify that substrate temperature, air temperature and relative humidity are within the manufacturer’s recommended ranges and will remain stable during curing times.

- B. Apply each layer of the system in accordance with manufacturer's instructions.
- C. Apply each layer at the upper end of the manufacturer's recommended thickness.
- D. Broadcast silica or quartz aggregate at layer in system as recommended by the manufacturer to achieve the required slip resistance.
- E. Sequence the installation of joint and base accessories as recommended by the system manufacturer to achieve the details shown by approved shop drawings.
- F. Install stripes and lettering of top coat materials where shown on drawings and as directed by Engineer.

3.04. PROTECTION OF FINISHED WORK

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to permit uninterrupted curing.
- C. Install base divider strips at all boundaries between sections of finish installed at different times.

END OF SECTION

SECTION 10416

BUILDING IDENTIFYING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building identification signs at the Jackson Ave. Pump Station.

PART 2 PRODUCTS

2.01 PLAQUE/BUILDING IDENTIFICATION SIGNS

- A. Building plaque shall be 23 inches wide by 15 inches tall cast aluminum with rounded corners. Border and letters shall be raised with satin finish polished bronze color. Background shall be dark bronze color leatherette finish. Mounting shall be concealed with stainless steel hardware.
- B. Borders, design lines and faces of raised letters of plaque to be satin finish aluminum. Background shall be gray leatherette design in aluminum. Border and design lines to be raised.
- C. Finished plaque to be free from defects and sprayed with oxidation retardant. Mounting shall be concealed.
- D. Plaque manufacturer shall develop plaque from design provided by Engineer and submit a proposed layout to Engineer. Following approval, the manufacturer shall submit full sized rub off for final approval, prior to plaque fabrication.
- E. Plaque to be manufactured by Matthews International Corporation; Southwell Company; Nelson Harkins Company; or equal.
- F. Draft design (final design including all missing information shall be provided by Engineer during construction).
 - 1. Note that there are elected Council Members in addition to the Mayor/Supervisor.
- G. Building Plaques mounted at locations as indicated on drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Plaques to be wall-mounted in a theft-proof manner using stainless steel threaded studs set with non-staining cement.

END OF SECTION

SECTION 10426

PIPE IDENTIFICATION

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install piping markers and stenciled labeling and all other required accessories in accordance with the Contract Documents.

1.02. SUBMITTALS

- A. Provide in accordance with Sections 01300, Submittals; 01640, Equipment-General; and as supplemented herein. Submittals shall include, but not be limited to, the following:
 - 1. Manufacturer's product data, including installation requirements and dimensions and sizes for each type of pipe marker required.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Seton Name Plate Corporation, New Haven, CT
 - 2. W.H. Brady Co.
 - 3. Or equal.

2.02. PIPING MARKERS

- A. All visible pipelines are to be color-coded. The exceptions are that flexible connectors, flexible vacuum tubing, stainless steel, copper tubing, and all chemical valves and appurtenances shall not be painted.
- B. Labels on pipelines are required and should be the plastic wrap-around type, or self-sticking type, which are commercially available; or spray stenciled labels in the appropriate color. Arrows indicating the direction of flow should be the same color as the lettering
- C. Label or stencil lettered legends on the piping at the horizontal or vertical centerlines. Place letterings below the horizontal centerline where pipelines are too close together or where located above normal line of vision (or above the centerline when pipeline is below the normal line of vision).
- D. Coding and labeling shall comply with the governing standard adopted by the State of New York.

- E. Locate lettered legends and bands at the following locations:
1. Where pipes enter or leave the room space.
 2. At junction points and points of distribution.
 3. Adjacent to valves and equipment.
 4. At changes in direction.
 5. At 30 feet maximum intervals along the piping where necessary for identification.
- F. Stencil same size arrows as letters, indicating direction of flow pointing away from the legend. Letter sizes and bandwidths are given in the schedule below:

Outside Diameter of Pipe Covering	Width of Letter	Color Band
3/4 to 1-1/4 inches	1/2 inch	4 inches
1-1/2 to 2-1/2 inches	3/4 inch	6 inches
3 to 6 inches	1-1/4 inches	8 inches
7 to 10 inches	2-1/2 inches	12 inches
Over 10 inches	3-1/2 inches	12 inches

- G. Cleanup and retouch as necessary all affected work. Leave all glass areas, unpainted fittings, plaster surfaces, floors and walks, hardware, and other surfaces clean and free from any paint, stain, smears, spattering or smudges.
- H. Do not paint over equipment identification tags.

2.03. PIPE COLOR CODING

- A. The following are the pipe color-coding requirements:
1. Raw Sludge Line - Gray.
 2. Sludge Recirculation Suction Line - Brown (with yellow bands on suction side).
 3. Sludge Drawoff Line/Sludge Transfer - Brown with orange bands.
 4. Sludge Gas Line/Digester Gas – (SS Pipe) with Orange bands
 5. Natural Gas Line - Red.
 6. Non-Potable Water Line - Purple.
 7. Potable Water Line - Blue.
 8. Sodium Hypochlorite/Chlorine Line - Safety Yellow.
 9. Wastewater Line - Gray.
 10. (Compressed) Air Line - Light Green.

11. Water Lines for Heating Digesters or Buildings - Blue with a 6-inch red band spaced 30 inches apart.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Preparation - Painting of piping in accordance with Section 09900, Painting, must be complete in accordance with the color schedule specified herein.
- B. Piping Markers - Apply piping markers in accordance with the manufacturer's written instructions in locations herein specified.

3.02. CLEANING AND PROTECTION

- A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

SECTION 10441

SIGNS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Interior and exterior wall-mounted fiberglass signs.
- B. Exterior wall-mounted or post-mounted parking space designation aluminum signs.
- C. Safety warning signs.
- D. Instructional signs.

1.02. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Manufacturer's Data - Submit descriptive literature and specifications, including color chart.
- C. Submit shop drawings depicting sign styles, lettering font, foreground and background colors, locations above finished floor and adjacent to doors, a list of all signs to be provided indicating sign location and text, and overall dimension of each sign and method of attachment.
- D. Submit manufacturer's standard warranty information.

1.03. REGULATORY REQUIREMENTS

- A. Wall-mounted signs shall conform to ICC/ANSI A 117.1 – 2003 - Accessible and Usable Buildings and Facilities.
- B. Exterior wall-mounted or post-mounted signs designating accessible parking spaces shall conform to ICC/ANSI A 117.1 – 2003 - Accessible and Usable Buildings and Facilities, and shall also conform to the applicable sections of Chapter 11 of the 2009 IBC.

1.04. DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in accordance with Section 01600, Materials and Equipment.
- B. Store and protect products in accordance with Section 01600, Materials and Equipment.
- C. Sign packages shall have exterior labels indicating the name of the building or buildings where they are to be installed.
- D. Store adhesive or tape materials at temperatures within the manufacturer's recommended installation temperature range.

1.05. ENVIRONMENTAL REQUIREMENTS

- A. For mounting methods utilizing adhesive or tape materials: do not install signs when ambient temperature is below 70 degrees F. Maintain this minimum during and after installation of signs.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. For Interior and Exterior Wall-Mounted Fiberglass Signs

1. Best Sign Systems, Inc., Montrose, CO.
www.bestsigns.com
(800) 235-2378
2. Apco Signs, Atlanta, GA.
www.apcosigns.com
(877) 988-2726
3. Gemini Incorporated
www.geminisignproducts.com
(800) 538-8377
4. ACE Sign Systems, Inc.
www.Acesign.com
(765) 288-1000
5. Or equal.

B. Exterior Post-Mounted Signs

1. Emed Co. Inc., Chicago, IL.
www.emedco.com
(800) 442-3633
2. Brimar Industries, Inc, Garfield, NJ
www.safetysign.com
(800) 274-6271
3. Gemini Incorporated
www.geminisignproducts.com
(800) 538-8377
4. Or equal.

C. Safety Warning Signs

1. Seton Identification Products, Branford, CT.
www.seton.com
(800) 571-2596

2. Emed Co. Inc., Chicago, IL.
www.emedco.com
(800) 442-3633
3. www.SafetySigns.com
(800) 274-6271
4. Or equal.

D. Instructional Signs - Interior and exterior wall-mounted fiberglass signs.

1. Best Sign Systems, Inc., Montrose, CO.
www.bestsigns.com
(800) 235-2378
2. Apco Signs, Atlanta, GA.
www.apcosigns.com
(877) 988-2726
3. ACE Sign Systems, Inc.
www.Acesign.com
(765) 288-1000
4. Or equal.

2.02. SIGNS

A. Interior Room Designation Signs

1. Etched fiberglass with non-glare, UV-resistant painted surface.
2. Base material thickness to be 0.125 inch.
3. Minimum Width - 10 inches; minimum height: 3 inches.
4. Room name lettering and Braille as required by ICC/ANSI A 117.1 – 2003.
5. Raised white letters on black background.
6. Vinyl foam tape mounting.
7. Best Sign Systems HC300, equal series by Apco Signs, or equal.

B. Exterior Room Designation Signs

1. Etched fiberglass with non-glare, UV-resistant painted surface.
2. Base material thickness to be 0.25 inch.
3. Minimum Width - 10 inches; minimum height: 3 inches.
4. Room name lettering and Braille as required by ICC/ANSI A 117.1 – 2003.

5. Raised white letters on black background.
 6. Mounting by countersunk stainless steel screws in pre-drilled holes with expansion sleeves. Plastic spacing sleeves behind signs as required to attain plum and true alignment.
 7. Best Sign Systems HC300, equal series by Apco Signs, or equal.
- C. Exterior Wall-Mounted or Post-Mounted Parking Space Designation Aluminum Signs
1. Sign Material - Non-reflective aluminum.
 2. Duroshield Tedlar top coat.
 3. Handicapped Parking Space Designation Signs
 - a. Text and graphics shall be as required by the referenced regulatory requirements, with the International Symbol of Accessibility.
 - b. Width 12 inches; height 24 inches.
 - c. Emed Co. Item Number 30840, equal by Brimar Industries, Inc., or equal.
 - d. White lettering against a blue background.
- D. Mounting Posts for Exterior Signs
1. Hot-dipped G90 galvanized steel U-channel.
 2. Stainless steel bolts for attaching the sign.
 3. Minimum Length - Size so that the bottom edge of the sign is 5 feet minimum above the adjacent pavement or walking surface.
 4. Minimum Post Embedment - 3 feet.
- E. Safety Warning Signs/Equipment Signs
1. Where self-adhesive application is possible: flexible vinyl with a clear polyester coating or high-performance polyester.
 2. Where it is necessary to mount the sign on railings or other framework near the hazard: 0.063-inch aluminum secured with stainless steel U-bolts or other appropriate stainless steel fasteners.
 3. Rectangular signs are to be a minimum size of 10 inches wide by 7 inches high.
 4. Chemical hazard diamonds are to be vinyl decals or rigid plastic depending on mounting conditions. 11 inches by 11 inches minimum size, with hazard numbers intended for use on the sign material. Signs shall be supplied by manufacturer of chemical.

F. Interior and Exterior Instructional Signs

1. Etched fiberglass with non-glare, UV-resistant painted surface.
2. Base material thickness to be 0.25 inch.
3. Minimum width 10 inches; minimum height 3 inches.
4. Room name lettering and Braille as required by ICC/ANSI A 117.1 – 2003.
5. Raised white letters on black background.
6. Mounting by countersunk stainless steel screws in pre-drilled holes with expansion sleeves. Plastic spacing sleeves behind signs as required to attain plumb and true alignment.
7. Best Sign Systems HC300, equal product by Apco Signs, or equal.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning installation means installer accepts existing surfaces.

3.02. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install signs after doors and surfaces are finished.
- C. Room identification signs shall be mounted:
 1. So that the baseline of characters shall be no less than 48 inches above, and no more than 60 inches above, the adjacent floor or ground surface.
 2. Outside the room on the wall next to the door on the latch side. For double doors, the sign shall be mounted to the right of the right-hand door.
 3. Where there is no wall space on the latch side of a single door, or to the right side of double doors, signs shall be mounted on the nearest adjacent wall.
 4. If wall space is not available in any of the locations designated in Items 1 through 3 above, signs may be mounted on the push side of doors provided that the doors are equipped with closers but do not have hold-open devices.
 5. The same location specifications apply to signs associated with doors whether at the interior or at the exterior of buildings.

- D. Parking space designation signs shall be either wall or post mounted so that the bottom edge of the sign is 5 feet above the adjacent walking surface or pavement.
- E. Safety warning signs shall be mounted so as to be clearly visible to the person approaching the equipment or area referenced by the sign. Sign locations shall be in compliance with OSHA regulations. Where possible, signs are to be mounted directly on the tanks, cabinets, or equipment referenced by the safety message. Coordinate mounting locations with Engineer.
- F. Instructional signs shall be mounted:
 - 1. So that the baseline of characters shall be no less than 48 inches above, and no more than 60 inches above, the adjacent floor or ground surface.
 - 2. Outside and the room on the wall next to the operating hardware of the overhead door.

3.03. REQUIRED SIGNS

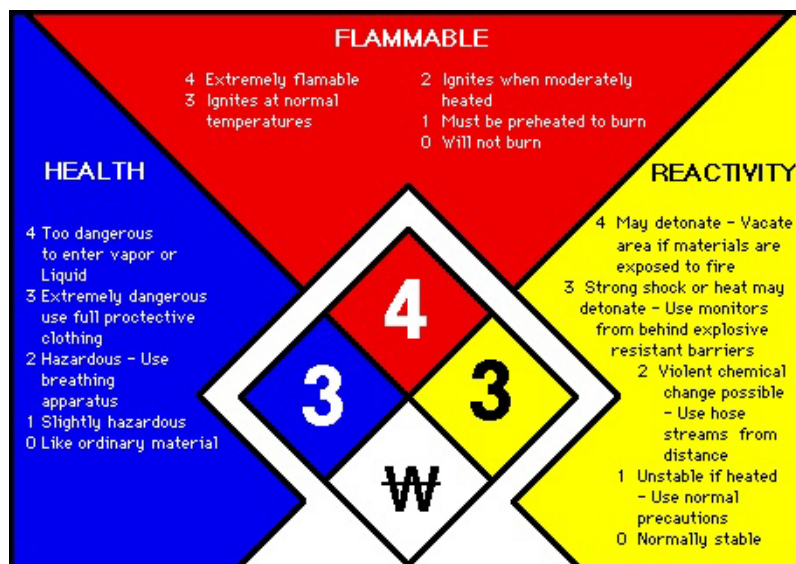
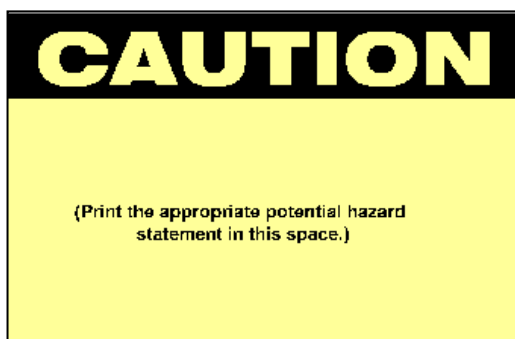
- A. Room Designation Signs - Provide sign with room name on doorway or entrance to each room of each building. Room names are shown on the Drawings. Exterior doors are also to be labeled, on the exterior side of the wall, with the name of the room to which the door gives access.
- B. Parking Space Designation Signs
 - 1. Handicapped Parking Sign – Mount as designated by the Engineer. The bottom edge of the sign is to be positioned 5 feet above the pavement surface. One sign is required.
- C. Provide red “NON-POTABLE WATER - DO NOT DRINK” safety signs at the following locations:
 - 1. Hose bibbs.
 - 2. Yard hydrants.
 - 3. Chemical systems.
 - 4. All other locations providing non-potable (plant water) or plant effluent water sources.
- D. Provide “LIFTING CAPACITY * TON”; red safety signs for all lifting monorails, and beams that are intended for lifting.

*Insert capacity. The asterisk in the preceding text shall be replaced by the lifting beam capacity shown on the structural drawings, or the lifting capacity stated in the approved submittal for monorails, as applicable.

- E. Tank and Channel Designation Signs – Provide sign with tank or channel name; handrail-mounted at every access point to the tank (stairway, platform, etc.). For tanks located at grade, provide one handrail mounted tank designation sign. Tanks to be identified shall include, but are not limited to:
 - 1. Influent channel.
 - 2. Chlorine contact tank.
- F. Vault Designation Signs - Provide name of each vault engraved in the access hatch to the vault.
- G. Equipment Designation Signs - Provide wall- or handrail-mounted equipment designation sign adjacent to each major equipment item, gate control or valve control shown on Drawings. Sign shall have full name of equipment and equipment I.D. both stated.
- H. Provide “CAUTION - EQUIPMENT STARTS AUTOMATICALLY” red safety signs at the following equipment:
 - 1. Submersible mixers.
 - 2. Process pumps.
 - 3. Chemical feed pumps.
 - 4. Motor-operated slide and gates.
- I. Provide “SAFETY GLASSES REQUIRED” safety signs at the following locations:
 - 1. All chemical feed areas.
- J. Provide “NO SMOKING” signs inside all entrances to the following buildings:
 - 1. Control Building.
 - 2. Disinfection Chemical Building.
- K. Provide red “CONFINED SPACE” sign with wording required by OSHA at appropriate locations.
- L. Emergency Safety Shower/Eyewash – Provide OSHA approved identification sign at each unit.
- M. Fire Extinguisher – Provide identifying sign at each unit.
- N. Chemical Health Hazard Designation Signs - Provide colored signs with chemical name, concentration, and four-component NFPA rating system at each chemical storage and fill station area. Signs shall also be at each access to the room or area and at each exterior wall with a means of access to the building per NFPA 704.4.3.

(continued)

3.04. FIGURES



END OF SECTION

SECTION 10522

FIRE EXTINGUISHERS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Fire extinguishers.

1.02. REFERENCES

- A. NFPA 10 - Portable Fire Extinguishers.
- B. UL 299 - Dry Chemical Fire Extinguishers.
- C. UL 711 - Rating and Testing of Fire Extinguishers.

1.03. SUBMITTALS FOR REVIEW

- A. Section 01300, Submittals: Procedures for submittals.
- B. Shop Drawings - Indicate cabinet physical dimensions, wall bracket mounted measurements, and location.
- C. Product Data - Provide extinguisher operational features, color and finish, and anchorage details.
- D. Manufacturer's Installation Instructions - Indicate special criteria and wall coordination requirements.
- E. Maintenance Data - Include test, refill or recharge schedules and re-certification requirements.
- F. Submit certifications for iron and steel products in accordance with AIS requirements and Section 01300, Submittals.

1.04. QUALITY ASSURANCE

- A. Provide units conforming with UL 711 and UL 299.

1.05. REGULATORY REQUIREMENTS

- A. Conform to applicable codes and NFPA 10 for requirements for extinguishers.

1.06. ENVIRONMENTAL REQUIREMENTS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Larsen's Manufacturing Company - Model MP10.
- B. JL Industries Incorporated - Model Cosmic 10E.
- C. Strike First - Model ABC 10-W.

2.02. EXTINGUISHERS

- A. Dry Chemical Type - UL 299, heavy duty steel tank with pressure gauge; Classes A, B, and C fires, size 10 lbs.
- B. Extinguisher Finish - Epoxy enamel, red color.

2.03. ACCESSORIES

- A. Extinguisher Brackets - Manufacturer's standard formed steel, Larsen's B-2 or equal.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Section 01039, Coordination and Meetings: Verification of existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install brackets plumb and level; secure rigidly in place 4 feet 4 inches from finished floor to top of fire extinguisher operating handle.
- C. Fasten brackets into masonry construction with adhesive anchors.
- D. Provide one fire extinguisher adjacent to each exterior personnel door. Maintain at least 6-inch clearance between edge of door and any part of extinguisher or bracket.
- E. Mount fire extinguishers at the locations indicated on plans.

3.03. SCHEDULE

- A. Provide fire extinguishers in the locations shown on the architectural drawings.

END OF SECTION

SECTION 10800

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Toilet and washroom accessories, including the following:

1. Toilet tissue holder.
2. Soap dispenser.
3. Mirror.
4. Paper towel dispenser.
5. Waste receptacle.
6. Stainless Steel Shelf.

B. Grab bars.

1.02. REFERENCES

ANSI A117.1	Accessible and Usable Buildings and Facilities
ASTM A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A167	Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A269	Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A1008	Steel Sheet, Cold-Rolled Carbon, Structural High Strength Low Alloy and High Strength Low Alloy with Improved Formability, Commercial Quality
ASTM B456	Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
NEMA LD-3	High Pressure Decorative Laminates

1.03. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Product Data - Provide data on accessories describing size, finish, details of function, attachment methods. Product literature shall be clearly marked to the specific model, size, finish, and configuration.

1.04. REGULATORY REQUIREMENTS

- A. Conform to ANSI A117.1 code for access for the disabled.

1.05. FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated and on product data furnished by the manufacturer.

1.06. COORDINATION

- A. Coordinate work under provisions of Section 01600, Materials and Equipment.
- B. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions and shower stalls to receive anchor attachments.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Bobrick, New York, NY.
- B. Bradley Corporation, Menomonee Falls, WI.
- C. American Specialties, Inc., Yonkers, NY.
- D. Substitutions - Under provisions of Division 1 sections.

2.02. MATERIALS

- A. Sheet Steel - ASTM A366.
- B. Stainless Steel Sheet - ASTM A167, Type 304.
- C. Tubing - ASTM A269, stainless steel.
- D. Fasteners, Screws, and Bolts - Hot dip galvanized or stainless steel.
- E. Expansion Shields - Fiber, lead, plastic, or rubber as recommended by accessory manufacturer for component and substrate.

2.03. FABRICATION

- A. Weld and grind joints of fabricated components, smooth.
- B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.
- C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges. Form bar with 1-1/2 inches clear of wall surface. Knurl grip surfaces.
- D. Shop assemble components and package complete with anchors and fittings.
- E. Provide steel anchor plates, adapters, and anchor components for installation.

2.04. KEYING

- A. Supply three keys for each accessory to Owner.

2.05. FINISHES

- A. Stainless Steel - No. 4 satin luster finish.
- B. Backpaint components with paint or other effective means of isolation where contact is made with dissimilar metals to prevent electrolysis.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify site conditions under provisions of Section 01039, Coordination and Meetings.
- B. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings and instructed by the manufacturer.
- C. Verify exact location of accessories for installation.

3.02. INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions and ANSI A117.1.
- B. Install plumb and level, securely and rigidly anchored to substrate with all fasteners concealed from view.

3.03. COMPONENTS

Item	Locations	Room Numbers	Bobrick*
20-inch Grab Bar Vertical	1 each	JA-101	B-6806 x 36
Two-Roll Toilet Paper Holder	1 each	JA-101	B-2740
Soap Dispenser	1 each	JA-101	B-4112
Mirror: 24 inches wide by 36 inches high	1 each	JA-101	B-290 2436
Stainless Steel Shelf	2	JA-101	B-295 x 18
Waste Receptacle	1 each	JA-101	B-2260

*Bradley or accessories from other manufacturers must be equal to Bobrick items listed.

END OF SECTION

SECTION 11291

SLUICE GATES

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish, install, and test sluice gates complete with operators, spare parts, manufacturer's services, and all other necessary appurtenances in compliance with the Contract Documents.
- B. Furnish, install, and test the influent 24-inch sluice gate complete with gate, manual actuator, spare parts, manufacturer's services, and all other necessary appurtenances, in compliance with the Contract Documents.
- C. Furnish, install, and test the 18-inch wet well equalization sluice gate complete with gate, manual actuator, spare parts, manufacturer's services, and all other necessary appurtenances, in compliance with the Contract Documents.
- D. Data not specified in this section shall be the manufacturer's standard for the size equipment specified.

1.02. REFERENCES

- A. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes
- B. ASTM D2000 - Rubber Products
- C. ASTM B505 - Standard Specification for Copper Alloy Continuous Castings
- D. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications
- E. ASTM D4020 - Standard Specifications for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
- F. ASME/ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings
- G. AWWA C561 - Fabricated Stainless Steel Sluice Gates

1.03. PERFORMANCE REQUIREMENTS

- A. All gates shall meet the leakage requirements of AWWA Standard C561, latest edition. In no case shall leakage exceed 0.10 gpm/ft of wetted seal perimeter in seating head and unseating head conditions.

1.04. SUBMITTALS

- A. Provide in accordance with Sections 013000, Submittals; 016400, Equipment-General; and as supplemented herein. Submittals shall include, but not be limited to, the following:
 - 1. Shop Drawings
 - a. Operating characteristics and nameplate data
 - b. Manufacturer's catalog information, descriptive literature, specifications, etc. for pumps, motors, and accessories.
 - c. Manufacturer's certified installation drawings containing all critical dimensions, weights, etc. required for installation of the equipment.
 - d. List of recommended spare parts other than those specified.
 - e. Electrical schematics.
 - f. Motor information.
 - g. Shop and field painting information. If no field painting is proposed, submit a certification from the manufacturer in accordance with Section 099000, Painting, for the Engineer's review and approval.
 - h. Shop and field testing procedures, equipment to be used and ANSI/HI testing tolerances to be followed.
 - i. Warranty.
 - 2. Performance affidavits.
 - 3. Certifications for iron and steel products in accordance with AIS requirements.
 - 4. Shop test results.
 - 5. Manufacturer's installation certificate.
 - 6. Certification of equipment compliance.
 - 7. Preliminary Field Test Reports
 - 8. Functional Test Reports.
 - 9. Training Plans.
 - 10. Recordings of training sessions (to be completed by and coordinated with the Contractor).
 - 11. Written training reports.

- B. Provide operation and maintenance manuals and data where scheduled in Section 016400, Equipment-General.

1.05. SPARE PARTS

- A. The following spare parts shall be provided in clearly identified dust-proof containers for each type of gate and gate actuator supplied:
 - 1. One lift nut of each type provided.
 - 2. One set of all bearings, O-rings, and seals.
 - 3. Battery-operated drill-type tool suitable for operating the manual gates after removal of the gate handwheel. One drill-type tool shall be provided for each size operating nut.

1.06. EQUIPMENT WARRANTIES AND GUARANTEES

- A. The supplier shall provide the following warranties and special guarantees in accordance with Section 016400, Equipment-General.
 - 1. The equipment manufacturer shall guarantee for a period of three years starting at the time of equipment delivery to the job site or one year starting at the time of Substantial Completion (whichever is shorter), that the equipment supplied is free from defects in materials or workmanship and will meet the specified performance requirements when operated in accordance with the manufacturer's recommendations. The manufacturer shall correct any breach in this warranty at their expense.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. The sluice gate manufacturer shall be the following:
 - 1. RW Gate Company
 - 2. Whipps, Inc
 - 3. Or equal.
- B. All gates provided under this Section shall be by a single manufacturer. The gate manufacturer is responsible for coordinating with actuator manufacturers, Owner, Engineer, and Contractor.

2.02. OR EQUAL AND SUBSTITUTIONS

- A. In the case of an “or-equal” or a substitution, demonstrate in writing, to the satisfaction of Owner that the manufacturer has produced the specified type and size of equipment for sanitary wastewater service that has been in successful operation for a minimum period of five years prior to the Bid date.
- B. Submit information for an or-equal” or substitution as required by the Contract.

2.03. EQUIPMENT DESIGN

A. General

- 1. Gates shall be fabricated of the material of the size and type scheduled or detailed on the Drawings. Gates shall conform to the applicable standards listed herein.
- 2. All materials used in the construction of the gates and appurtenances shall be designed for the application and shall conform to the material specifications listed for each type of gate. All equipment including frames, discs, guides, stems, stem couplings, stem connections, assembly bolts, studs, nuts, and anchor bolts shall be designed for the design head such that the working stress shall not exceed 1/2 the tensile, compressive, and shear yield strength and 1/4 the ultimate tensile, compressive, and shear strength of the components.
- 3. All mating surfaces shall be accurately formed to ensure proper operation.
- 4. Gates shall be of the rising stem type unless otherwise noted on the gate schedule or Contract Drawings. Clear butyrate-plastic pipe covers with mylar position indicators shall be furnished and installed on all rising stems.
- 5. Gates shall be fabricated in the United States and made of U.S.-forged metals.
- 6. Existing frames shall be replaced with new frames for all gate installations
- 7. Seats and seal shall be replaceable

B. Stainless Steel Gates

- 1. General – Stainless steel sluice gates shall conform to ANSI/AWWA C561-04, except where modified by this section.
- 2. Materials
 - a. Frames, discs, guides, yokes, stem and stem couplings, stem guide bushings, mounting brackets, rising stem thrust nuts, actuator pedestals, and floor stands shall be Type 316/316L stainless steel as designated in the gate schedule. Type 316/316L shall be used for all welded components.
 - b. Wall thimbles shall be constructed of the same material as the gate disc unless otherwise indicated in the gate schedule.

- c. Side seals, invert seals and top seals shall be ultra-high molecular weight polyethylene (UHMWPE) meeting ASTM D4020.
 - d. Flush bottom seals and seats shall be UHMWPE meeting ASTM D4020. Flush bottom seals and seats may also be neoprene or EPDM meeting ASTM D2000.
 - e. Lift nut and non-rising stem thrust nut shall be bronze meeting ASTM B584 or ASTM B505.
 - f. Gear housing and handwheel or crank shall be cast iron or aluminum.
3. Disc
- a. The disc or sliding member shall have a minimum thickness of 1/4 inch for all members except seal retainers.
 - b. Sluice deflection shall not exceed 1/720 of gate width at maximum design head.
4. Stems and Stem Connections - The gate stem shall be connected to the disc by a thrust nut or a thru-bolt connection. The stem connection shall prevent rotation of the thrust nut.
- a. Rising stem thrust nuts shall be threaded and keyed or threaded and pinned to the stem.
 - b. Non-rising stem thrust nuts shall be threaded but not keyed.

C. Guides and Frames

- 1. Guides and frames shall have a minimum material thickness of 1/4 inch for all members except seal retainers. Guides shall be integral with frame or bolted to the frame.
- 2. The disc shall engage the guides for the full length of the disc. Lateral clearance between disc and guides shall permit free travel.
- 3. Guides shall support at least two thirds of the disc height when the disc is in full open position. Guides shall be of sufficient length to ensure that the gate operates with a smooth, even, uniform movement without jerking, binding or twisting.
- 4. Frames designed for mounting on the face of concrete shall be provided with a flanged back design and holes for anchor bolts every 18 inches. Frames designed for embedment in concrete shall be provided with keyways to lock into the concrete.
- 5. Self-contained gate frames shall extend above the disc full-open position or above the top of the wall and shall have structural members welded or bolted between guides to form a yoke to support the gate actuator.

D. Seats and Seals

1. Gate assemblies shall have an integral self-adjusting seat-seal system to restrict leakage as specified and prevent metal to metal contact between the frame and slide. Adjustable wedges, wedging devices, or pressure pads are not permitted.
2. Gates utilizing “J” seals or “P” seals are not acceptable.
3. Seal system shall be of UHMW polyethylene construction.
4. Seats and seals shall be secured to the frame or the disc to ensure they will remain in place, free from distortion or loosening during the life of the gate.
5. Seating-sealing surfaces shall contact their mating surface to meet the leakage requirements specified herein.
6. Seat contact pressure shall not exceed 600 psi at the design head. Top and bottom seat are considered as non-load bearing for this calculation.
7. Where the top of the guide extends to the top of an adjacent wall or bottom of an elevated slab, the gate assembly shall also have a plate or bar mounted at the top of the opening to form a top seat.
8. Flush Bottom Seals
 - a. Where the gate invert level is shown on the Contract Drawings to match the surrounding structure invert elevation, gates shall be flush bottom.
 - b. Flush bottom seals shall meet leakage requirements specified herein.
 - c. The flush bottom seal shall be mounted on the disc or the frame and shall be held securely in place, free from distortion or loosening during the life of the gate. When seal is mounted on the disc, a machined stainless steel stop bar shall be bolted and keyed to the frame, forming a flush invert.
 - d. The shape of the seal shall produce a seating surface having a minimum width of 3/4 inch and the seal shall extend into the guide.
 - e. 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.

E. Yokes

1. Self-contained gates shall be designed to withstand the thrust of the actuator when 40-lb. effort is placed on the handwheel or crank, with a minimum safety factor of four for ultimate tensile, compressive, and shear strength; and two for yield tensile, compressive, and shear strength.
2. Yokes for electric actuators shall be designed for a safety factor of 1.5 with regard to yield strength at the locked-rotor torque of the actuator.

3. Yoke deflection should not exceed 1/360 of gate width at maximum operating load.
4. The actuator mounting and guide contact surfaces shall be accurately formed to ensure proper stem alignment. The yoke shall be designed to allow removal of the slide from the gate assembly.

F. Stem and Stem Couplings

1. Gate stems shall be designed to have a maximum L/r (length/radius of gyration) of 200.
2. Threaded portion of the stem shall have a minimum outside diameter of 1-1/2 inches.
3. Stems, stem couplings, and stem connections shall be designed to withstand the load caused by application of 40-lb. effort on the crank or handwheel with a minimum safety factor of 2, 50-ft/lb. torque on the wrench nut, and 1.25 times the output thrust developed by the motor-locked rotor torque of the electric actuator and meet the minimum safety factor listed herein.
4. Stems of more than one section shall be joined by solid stainless steel couplings threaded and bolted, threaded and keyed, or bored and bolted to the stems. Stem couplings shall be of greater strength than the stems. All threaded and keyed couplings of the same size shall be interchangeable.
5. Threads shall be machine cut or rolled full depth Acme thread or American Standard General Purpose Acme thread. Where unified screw threads are used, the pitch may not be finer than Unified National coarse threading.
6. Gates shall be provided with stop collars or other positive means of preventing the gate from operating outside the intended range of disc travel. Stop collars or other approved methods of limiting gate motion shall be field adjusted according to the manufacturer's instructions at the time of gate installation.

G. Stem Guides

1. Stem guides shall be adjustable in two directions and shall be spaced at sufficient intervals to support the stem. Guide spacing shall not exceed 10 feet.
2. Stem guides shall be constructed of stainless steel with UHMWPE bushings.
3. Stem guide brackets may be mounted on the gate guides or yoke or may be mounted on the adjacent structure.
4. Wall-mounted guides shall provide lateral adjustment between the wall and the guide bracket and between the guide bracket and the guide for field alignment.
5. Guides mounted on the gate assembly shall be designed and fabricated to assure proper alignment. The guides shall allow for adjustment to permit proper alignment.
6. Stem guide assemblies and their anchor bolts shall be designed to maintain the alignment under all operating loads.

H. Accessories

1. Assembly bolts, studs, nuts, and anchor bolts shall be of size and thickness to meet the minimum safety factors listed herein.
2. Circular flanged-back gates mounting to pipe flanges shall mate with class 250-lb. or class 125-lb. drilling as specified in ANSI/ASME B16.1.
3. Mounting bolts or studs shall be of adequate number and spacing to seal the mounting flange and resist the shearing action caused by operating forces. Where adhesive anchors or expansion anchors are used, the bolt loads shall not exceed the bolt manufacturer's recommendations.

I. Gate Options

1. Self-Contained Gates
 - a. Gates so designated in the schedule or as shown on the Drawings shall have extended guides to allow the gate to fully open.
 - b. The guides shall be sufficiently strong to preclude further reinforcing.
 - c. The yoke shall be fabricated from the guide material and attached to the side guides to form a one-piece rigid frame.
 - d. The yoke shall have a bearing surface for a mounting plate for the operator.
 - e. Construction of the yoke shall allow the disc and stem to be removed without disconnecting the yoke.
 - f. Unless scheduled otherwise, all self-contained sluice gates shall be rising stem.

J. Mountings

1. The sluice gate equipment and appurtenances shall be installed in accordance with the Installation Manual furnished by the gate manufacturer. Extreme care should be used in handling, storage, and installation of this equipment to prevent damage or distortion of the equipment and to insure proper performance.
2. Gates shall be Mounted with flange back anchor bolt type arranged for upward opening gates mounted on concrete face or surface.
3. Dissimilar metals, such as stainless steel and ductile iron, shall be isolated in accordance with manufacturer recommendations.
4. Provide oversized gates or extra wide mounts for gates mounted over pipe penetrations.

2.04. GATE OPERATORS

A. General

1. Actuators shall be as scheduled.
2. Actuator shall have a bronze lift nut threaded to fit the operating stem.
3. Tapered roller or ball bearings shall be provided above and below the flange on the lift nut to take the thrust developed during gate operation.
4. All bearings and gears shall be enclosed in a weatherproof cast iron, ductile iron or aluminum housing, as recommended by manufacturer, with oil seals and O-rings or mechanical seals used to seal the unit.
5. Fittings shall be provided so that all bearings and gears can be periodically lubricated.
6. Actuator shall be supplied with pedestal, torque tube, or baseplate, machined and drilled for mounting the lift housing and ready for bolting to the operating floor, top wall mounting bracket, or gate yoke, as required.
7. The direction of wheel or crank rotation to open the gate shall be indicated on the actuator. Single-speed actuators shall open counterclockwise and two-speed actuators shall open counterclockwise for the low mechanical-advantage gear ratio. Single-speed actuators at the high mechanical advantage gear ratio shall open clockwise.
8. All gates 48 inches and wider and having widths greater than twice their height shall be provided with dual stems and with two actuators connected by a tandem shaft for simultaneous operation unless otherwise specified. Cross shafting shall be stainless steel. Flexible couplings shall be provided at either end of the cross shafting.
9. Actuator shall be sized to permit sluice operation with an effort of not more than 40-lb. pull on the handwheel-hand crank for rising stem or 50-ft/lb. torque on the lift nut input shaft for non-rising stem.
10. Non-rising stem manual operators shall have a position indicator with a dial or digital display in full step with gate to show the position of the gate at all times. Indicator dial shall be graduated in 25 percent increments at a minimum. Rising stem manual operators shall have mylar position indicators shown on the stem cover in 25 percent increments at a minimum.
11. Each rising stem actuator shall be provided with a stem cover unless otherwise specified. Cover shall be made of clear butyrate-plastic pipe that will not discolor, crack, or become opaque for at least five years after installation.
12. Floor stands shown on the Contract Drawings or designated in schedule to be mounted on vertical wall shall be provided with a bracket suitable for wall mounting.

13. Floor stands shown on the Contract Drawings or designated in schedule to be mounted over grated areas, mounting brackets shall be oversized larger than floor stand baseplate with 2-inch clearance on all sides to allow for support of adjacent grating.
14. Floor stands shall be fabricated from stainless steel. The adaptor plate and baseplate shall have a minimum thickness of 1/2 inches.
15. Baseplate shall be designed so as not to interfere with any adjacent grating, walls, or any other mechanical equipment.

B. Manual

1. All actuators shall be supplied with a 2-inch square operating nut, and either a removable cast iron or aluminum crank arm with revolving brass grip or a removable cast iron or aluminum handwheel as scheduled.
2. Handwheels shall be direct drive-type handwheel without reduction gearing. The maximum handwheel diameter shall be 24 inches.
3. Crank actuators shall be provided with single or double-reduction gearing as necessary to meet lifting capacity.
 - a. Drive gears used in gear reduction actuators shall be steel and accurately machined, with cut teeth to provide smooth and proper operation.
 - b. Input shafts shall be stainless steel and supported by tapered roller or other roller-type bearings designed to withstand the radial and thrust loads generated during operation.
 - c. All geared actuators shall be suitable for operation by use of a portable motor apparatus.
 - d. The maximum crank radius shall be 15 inches.

2.05. FABRICATION REQUIREMENTS

- A. Contractor shall verify all dimensions and notify the Engineer of any discrepancies prior to fabrication.
- B. Manufacturer shall provide surface preparation and prime coating in accordance with the coating system specified in Section 099000, Painting. Manufacturer's standard surface preparation and prime coating are acceptable if the equipment manufacturer certifies that the coating meets or exceeds requirements specified in Section 099000, Painting, and is approved by the Engineer.
- C. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- D. Anchor bolts shall be Type 316 stainless steel.

- E. Isolate dissimilar metals with dielectric using appropriate fasteners.
- F. Welds shall be continuous unless noted otherwise.
- G. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- H. Furnish nameplates for each gate in accordance with Section 016400, Equipment-General.
 - 1. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins.
 - 2. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the equipment performance ratings.
- I. Where it does not affect system performance, all sharp edges of equipment shall be rounded with edge grinding or other means to provide satisfactory paint adherence and prevent injury.

2.08 SHOP TESTING

- A. Equipment shall be tested in the manufacturer's shop in accordance with the requirements of Section 016400, Equipment-General, and as specified herein.
 - 1. The gates and operators shall be completely shop assembled, inspected, and tested to ensure proper operation, fit, and adjustment of all parts.
 - 2. The gates shall be fully opened and closed in the guide system to ensure they operate freely.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- B. Actuators shall be installed in accordance with the sluice gate and actuator manufacturers' recommendations.
- C. No modifications to equipment shall be made without the written consent of the manufacturer and approval of Engineer.
- D. The General Contractor is responsible to field verify all dimensions and elevations prior to submittal review. Notify Engineer of specific differences.
- E. The General Contractor is responsible to ensure the specified equipment fits in the designated spaces without conflicts. The General Contractor is responsible to correct and resolve all conflicts at no additional cost to the Owner.

- F. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for testing and startup.
- G. Surface preparation and field painting shall be in accordance with Section 099000, Painting.
- H. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- I. Backpaint aluminum in contact with painted or galvanized steel or concrete with 5 mil of Tnemec Series 66-Gray, Hi-Build Epoxoline or DuPont 25P Epoxy.
- J. Isolate dissimilar metals by backpainting or with dielectric using stainless steel fasteners.
- K. All necessary attaching bolts and anchor bolts shall be ASTM A276 Type 316 stainless steel and shall be furnished by the sluice gate manufacturer.
 - 1. All sluice gates mounted on concrete faces or walls shall have a mastic seal or gasket provided between the concrete face and guide frame back.

3.02. TESTING AND STARTUP

- A. Testing and startup shall be performed in accordance with Section 01660, Testing and Startup, and as specified herein unless otherwise noted.
 - 1. Preliminary field testing.
 - 2. Functional testing.
 - 3. Startup.
- B. All testing shall be done in the presence of the Engineer and the equipment manufacturer or their approved representative.
- C. Preliminary field test shall demonstrate the following:
 - 1. Equipment is permanently installed in the correct location and orientation.
 - 2. Equipment is properly adjusted, aligned, and lubricated.
 - 3. Equipment is prepared for operation in strict accordance with the Contract Documents and with manufacturer's recommendations.
- D. Functional Test shall consist of the following tests:
 - 1. Verification of compliance with all seating tolerances and leakage requirements. Contractor is responsible for supplying any plugs, pumps, weirs, etc., necessary to conduct the tests, including means to accurately measure the quantity of water leaked.

2. The gate disc shall be fully opened and closed, in the field, to ensure that it operates freely and that the required clearance between the frame and gate guide groove is maintained.
 3. The electrically and hydraulically actuated gates shall be fully opened, fully closed, and modulated in the field, to verify proper operation of the gate and actuators.
 4. Verification that the hydraulically actuated gate will close in the event of a power failure
- E. Adjust, repair, modify, or replace any components of the system that fail to meet all specified requirements.

3.03. SERVICE OF MANUFACTURER'S REPRESENTATIVE

- A. Provide services of the equipment manufacturer or their approval representative in accordance with Section 016400, Equipment-General, and as specified herein.
- B. A qualified representative of the equipment manufacturer shall be on site for the following activities:
1. Installation.
 2. Preliminary field testing.
 3. Functional testing.
 4. Startup.
 5. Training.
 6. As necessary to provide submittals in accordance with Article 1.06.

3.04. EQUIPMENT SCHEDULE

- A. All equipment furnished under this section shall be in accordance with equipment schedule on the following page.

(continued)

SLUICE GATE SCHEDULE

Tag ID	Location	Size of Opening (W x H) (inches)	Sluice Height (inches)	Type	Gate Type	Gate Material	Operator	Bottom of Gate Elevation		Operating Deck Elevation	Notes
								Fully Raised	Fully Lowered		
SLUICE GATES											
	Influent Gate	24 x 24	48"	Flange Back Anchor Bolt	Non-Self-Contained	Stainless Steel	Manual	141	143	157.5	1, 2, 3
	Wet Well Equalization	18 x 18	36"	Flange back anchor bolt	Non-Self-Contained	Stainless Steel	Manual	137.5	136	147	1, 2, 3

NOTES:

1. All elevations are based off of existing drawings. Prior to shop drawing submission, Contractor shall field verify all elevations and notify the Engineer of any discrepancies prior to fabrication.
2. Gates and frames are replacing existing equipment or shall be installed in an existing structure. Contractor shall field-verify existing channel widths, depths, openings, and conditions for new gate and notify the Engineer of any discrepancies prior to fabrication.
3. Equipment installed shall be suitable for use in a Class I, Division 1, Group D area.

END OF SECTION

SECTION 11300

PUMPING EQUIPMENT - GENERAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Pressure gauges.
- B. Pressure transmitters.
- C. Isolation Rings.
- D. Diaphragm seals.
- E. Nameplates.
- F. Shop and field test procedures.

1.02. SUBMITTALS

- A. Provide in accordance with Section 01300, Submittals; Section 01640, Equipment-General; and as supplemented herein. Submittals shall include, but not be limited to, the following:
 - 1. Shop drawings.
 - 2. Pump nameplate designations, in table format.
 - 3. Performance affidavits.
 - 4. Shop test procedures, complete with list of instruments, description and sketch of process, and sample calculation form.
 - 5. Shop test results.
 - 6. Installation Certificate.
 - 7. Training Plans.
 - 8. Recordings of training.
 - 9. Training Reports.
 - 10. Functional Test Reports.
 - 11. Performance Testing Reports.
- B. Provide operation and maintenance manuals and data in accordance with Section 01640, Equipment-General.

1.03. COORDINATION

- A. Contractor shall coordinate with pump manufacturers so that all pressure gauges are from the same manufacturer.
 - 1. Seals shall be of the same manufacturer as the pressure gauge.
- B. Contractor shall coordinate with pump manufacturers so that all pressure switches are from the same manufacturer.

PART 2 PRODUCTS

2.01. PRESSURE GAUGES

- A. Pressure gauges shall be installed on the suction and discharge sides of all pumps, on all pump seal water/flushing connections, and any other miscellaneous liquid system applications shown on the Contract Drawings.
- B. No pressure gauges shall be required on sump, polymer feed, or screw pumps unless otherwise required by Contract Documents.
- C. Pressure gauges shall be of the bourdon tube type with 4-1/2-inch diameter dial.
- D. Case ring shall be black epoxy coated aluminum, bourdon tube shall be phosphor bronze with a brass tip, and window shall be glass.
- E. Pressure gauges shall be stem mounted and installed close to the suction and discharge flanges of the pump. Pressure gauges shown on the Contract Drawings shall be installed at the locations shown.
- F. Pressure gauges shall be calibrated to read zero at atmospheric pressure.
- G. Suction pressure gauges shall be of the compound type gauges calibrated to read 25 feet of water above and below zero.
- H. Discharge pressure gauges shall be calibrated to read from 0 feet to a minimum of 5 feet of water pressure above pump shutoff head.
- I. Pressure gauges shall be Type 300 as manufactured by Ashcroft Inc; or equal.

2.02. ISOLATION RINGS

- A. Isolation rings shall be provided for all pressure gauges and pressure switches to be installed in suction and discharge piping for sludge and scum pumps.
- B. Isolation rings shall be bolt-thru type with ANSI/AWWA Class 150 carbon steel flanges.
- C. Flexible liner shall be Buna-N
- D. Fluid fill shall be glycerin

- E. Isolation rings shall be designed to allow for safe removal of pressure gauges and pressure switches without loss of fill fluid and without need to shut down process pressure.
- F. Isolation rings shall be Type 80/81 as manufactured by Ashcroft Inc.; or equal.

2.03. DIAPHRAGM SEALS

- A. Continuous duty, clamped Teflon diaphragm seals shall be provided for all pressure gauges to be installed in suction and discharge piping that does not convey sludge or scum.
- B. Pressure gauges and diaphragm seals shall be by same manufacturer and shall be shipped as complete units, factory filled with silicone fluid.
- C. Each diaphragm seal shall have Type 316 stainless steel upper and lower housings. The lower housing shall be a threaded connection.
- D. Each pressure gauge and diaphragm seal unit shall be connected with the necessary brass pipe fittings and a brass stopcock.
- E. Pressure gauges and diaphragm seals shall be shipped as complete units, factory filled with silicone fluid.
- F. Each diaphragm seal shall have Type 316 stainless steel upper and lower housings. The lower housing shall be a threaded connection.
- G. Each diaphragm seal unit shall be connected with the necessary brass pipe fittings and a brass stopcock.
- H. Diaphragm seals shall be Type 300 as manufactured by Ashcroft Inc.; or equal

2.04. NAMEPLATES

- A. Supplementing the requirements of the individual pump sections, furnish nameplates for each pump.
- B. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins.
- C. Nameplates shall identify the manufacturer, model, serial number, size, characteristics, and appropriate data describing the equipment performance ratings including primary pump rating point in gallons per minute and total dynamic head, speed, efficiency at primary rating point, pump size, model number, and serial number.

2.05. FABRICATION REQUIREMENTS

- A. Shop coat per manufacturer's standard finish system and color.
- B. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- C. Welds shall be continuous unless noted otherwise.

- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.06. SHOP TESTING

- A. All pumps shall be tested in the manufacturer's shop in accordance with the requirements of Section 01640, Equipment-General, and as specified herein.
- B. Conduct performance test of all pumps under simulated design conditions in factory prior to shipment.
 - 1. Test conditions shall include:
 - a. Design point.
 - b. Secondary design points, if applicable. Secondary design points shall include any minimum or low flows which require motor speed reduction.
 - c. Shutoff head.
 - 2. Deviation of actual data from specified performance criteria shall not exceed ± 3 percent.
 - 3. Develop pump curve for each pump type using at least 10 actual data points for each curve.
 - 4. Record motor amperage and brake horsepower and efficiency at each data point at the pump curve.
- C. Engineer and Owner reserve the right to witness the shop test on each pump before the pumps are assembled for shipment to the project site. The pump manufacturer shall give Engineer and Owner ample notice in advance of when shop tests are scheduled so that Engineer and Owner can make arrangements to witness the tests, if desired. Engineer and Owner will be responsible for expenses associated with observing shop testing.
- D. The manufacturers shall submit certified copies of the test data to Engineer and receive approval of the test data before shipment of the pumps to the site. Include results of factory testing in the O&M Manual.
- E. Final acceptance of the equipment will be dependent upon the satisfactory operation and performance after installation.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- B. No modifications to equipment shall be made without the written consent of the manufacturer and approval of Engineer.

- C. Field verify all dimensions and elevations. Notify Engineer of specific differences.
- D. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for testing and startup.
- E. Surface preparation and field painting shall be in accordance with Division 9 specifications.
- F. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- G. Anchor rods (bolts) shall be Type 316 SS HILTI-style adhesive anchors.
- H. Backpaint aluminum in contact with painted or galvanized steel or concrete with 5 mils of Tnemec Series 66-Gray, Hi-Build Epoxoline or DuPont 25P Epoxy.
- I. Isolate dissimilar metals by backpainting or with dielectric using stainless steel fasteners.

3.02. TESTING AND STARTUP

- A. Testing and startup shall be performed in accordance with Section 01660, Testing and Startup, and as specified herein.
- B. All testing shall be done in the presence of the Engineer and the equipment manufacturer or their approved representative.
- C. Preliminary field tests shall be made after installation of the pumps. Functional testing shall demonstrate the following:
 - 1. That the units have been properly installed and are in proper alignment.
 - 2. That the units operate without overheating or overloading of any parts and without objectionable vibration.
 - 3. That there are no mechanical defects in any of the parts.
 - 4. That the pumps can deliver the specified pressure and quantity at the rated speed. All Functional Tests shall be conducted with clean water from the plant water supply system unless otherwise noted. Contractor shall provide all temporary flow measurement devices as necessary to achieve accurate measurement of the pumped flow during the field tests. If pumps are VFD-driven, tests should be performed using approved VFDs.
 - 5. That the pumps can pass the size of solids specified and the type of liquid for which the pumps are to be used.
- D. During Functional Testing, readings of all essential data shall be recorded at a minimum of four operating points. Data taken shall include suction and discharge pressure, inlet and outlet water surface elevation, flow, pump speed, and motor amperage. All field testing information shall be summarized in a report and submitted to Engineer for approval. Deviation of actual data from specified performance criteria shall not exceed ± 3 percent.

3.03. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide services of the equipment manufacturer or their approval representative in accordance with Section 01640, Equipment-General, and as specified in the specification sections for each pump type.

END OF SECTION

SECTION 11303

DRY PIT SUBMERSIBLE PUMPS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Furnish and install, ready to operate, four dry pit submersible non-clog pumps, including drive and motor, controls (in station control panel), complete with all necessary accessories, in compliance with the following specifications and as shown on the Drawings.
- B. Provide all pipe fittings to connect the supplied equipment to the piping shown on the Contract Drawings.
- C. Performance affidavit shall be provided for entire pumping system, including pump, drive, and motor and controls.

1.02. REFERENCES

- A. ANSI Class 125
- B. SAE 1045

1.03. PERFORMANCE REQUIREMENTS

- A. Jackson Avenue Pump Station

- 1. Raw Sewage Pump - Pump shall be capable of pumping raw sewage and fibrous material without clogging for the following operating conditions:

	Design Point (2 Pumps in Operation)	Duty Point 1 (1 Pumps in Operation)	Duty Point 2 (3 Pumps in Operation)
Capacity (gpm)	1500 (750 each pump)	850	1960 (650 each pump)
TDH (feet)	135	127	143

- 2. Pump characteristics shall be as follows:

Motor Horsepower	50 HP
Maximum Pump Speed (Nominal)	1800 rpm
Minimum Total Efficiency at Point 1	58%
Minimum Suction/Discharge Connections (inches)	4 inches/4 inches

- 3. Motor shall be 460 volt, 3 phase, 60 cycle.

- B. Solids passing capability of the pump shall be a minimum of a 3-inch spherical solid without the use of a cutting-type impeller.

1.04. DESIGN REQUIREMENTS

- A. The pumps shall normally operate in a dry pit.
- B. All pumps must be capable of operating in both unsubmerged (dry) and partially or completely submerged conditions without requiring any changes or modifications to the pump in between a change in the conditions (from partially or completely submerged to unsubmerged or from unsubmerged to partially or completely submerged) for continuous 24-hour/day operation without damage.
- C. The pump motors shall be guaranteed to run totally, partially, or non-submerged condition for continuous 24-hour/day operation without damage.
- D. The pumps shall be able to fit through the existing hatch in the dry well ceiling as shown on the Drawings.
- E. Contractor shall provide fittings as necessary to accommodate the suction/discharge connections required to adapt to piping shown on Drawings.

1.05. QUALITY ASSURANCE

- A. The manufacturer of the equipment specified herein shall be regularly engaged in the design and manufacture of the type of equipment described herein for at least seven years. The manufacturer's experience will include at least 10 installations of similar design as that specified herein.

1.06. SUBMITTALS

- A. Shop drawings in accordance with Sections 01300 and 01640. Shop drawings shall also include the following:
 - 1. For existing dry wells, Contractor shall field verify all dimensions and notify Engineer of any specific differences between the pump and piping layout shown on the Drawings and the proposed pump and piping layout.
- B. Manufacturer's certificates including performance affidavit for all equipment furnished under this section in accordance with Sections 01300 and 01640.
- C. A specific description of the shop test procedure.
- D. Unless the manufacturer is specifically named in these specifications, the following must be provided with the items indicated in 1.07.A and B:
 - 1. A reference list showing that the proposed supplier is in compliance with paragraph 1.06.A.

2. The following information for the 10 references given in Article 1.07.D.1. above so that the Engineer is able to verify 10 of the installations: name and address of the client and location of installation, if different; name of person in direct responsible charge; telephone number of person in direct responsible charge; details of the equipment; installation date; startup date; and full performance details. It is the sole responsibility of the Contractor to provide the information necessary for the Engineer to contact these references.
- E. Name of firm who will perform vibration testing. Provide proof of experience and references.
- F. Manufacturer's instructions in accordance with Section 01300.
- G. Certified pump curves for each pump.

1.07. SPARE PARTS

- A. The manufacturer shall furnish the following spare parts in clearly identified containers. Provide one set of spare parts for each pump.
 1. Replacement set of all bearings.
 2. Replacement set of mechanical seals.
 3. All gaskets.
 4. All O-rings.
 5. One impeller bolt.
 6. One seal fail relay and relay socket.

PART 2 PRODUCTS

2.01. MANUFACTURERS AND MODEL

- A. Jackson Avenue Pump Station – The pumping equipment shall be Model XFP 100J-CH1.341/PE350/4 by Sulzer ABS; or equal.

2.02. EQUIPMENT DESIGN

- A. General
 1. The pumps shall be of the dry pit mounted, submersible, non-clogging type for pumping raw sewage.
 2. The pumps shall be vertical, non-clogging, centrifugal sewage pumps with bottom inlet and side discharge.

3. Each pump shall include a motor, bearings, suction elbow, discharge elbow, anchor bolts, foundations, spare parts and all accessories specified herein.
4. All major components of the pumping unit (i.e. suction/discharge elbow, volute casing, stator housing, etc) shall be manufactured from close grained cast iron.
5. All nuts, bolts, washers, and other fastening devices supplied with the pump shall be 316 stainless steel.
6. Pumps shall be furnished with standard Class 125 cast iron suction and discharge flanges.

B. Pump Volute Casings

1. Casing shall be constructed of close-grained cast iron, ASTM A48 Class 35B, and shall be designed to withstand hydrostatic heads equal to 1-1/2 times the maximum shutoff head without leakage or undue distortion or deflection.
2. Minimum casing thickness shall be 7/8-inch with a maximum working pressure of 50 psi.
3. Piping immediately downstream of discharge flange shall be provided with a 1-inch or 3/4-inch valved tap for vent line and 1/4-inch gauge connections. Pipe immediately upstream of the suction flange shall be tapped for a 1/4-inch suction gauge.
4. Handholes for easy cleaning and inspection shall be provided by the pump manufacturer either in the pump casing, as a part of a full diameter spool piece on the pump suction, or in pump suction elbow. The handhole covers shall be cast so that its interior surface shall match the internal volute contour of the pump.
5. The suction and discharge connections shall be flat faced and drilled to American Standard flange dimension, Class 125.

C. Impeller

1. Impeller shall be close-grained cast iron, ASTM A48 Class 35B, non-clog design.
2. The impellers shall have smooth, well-rounded passageways that gradually increase in size from the impeller eye to the tips of the impeller.
3. The entire rotating assembly of the units must be capable of being removed for inspection or repair without disturbing the suction and discharge piping connections.
4. The impeller hub shall be keyed to the pump shaft and secured by a bronze or stainless steel lock nut or corrosion-resistant lock bolt and shall be easily removed for installation of impeller without the use of special tools.

D. Pump Shaft - Shall be 420 stainless steel.

E. Mechanical Seals

1. Tandem mechanical seals shall contain the following components and materials of construction: silicon carbide vs. silicon carbide, nitrile, or 316 Stainless Steel faces on both upper and lower sets.
2. Regular maintenance, or adjustment shall not be required and the seals shall not be dependent on the direction of rotation for proper sealing.
3. Seal water shall not be required for the mechanical seals.

F. Bearings

1. Each pump shall be provided with at least one cylindrical roller bearing, and three heavy duty bearings of the ball or roller type.
2. Bearings shall be permanently lubricated and greased.
3. Bearings shall be independent of the casings.
4. Bearings shall be sized and properly spaced to carry the loads imposed under continuous service without undue heating and to minimize shaft deflection.
5. Minimum L-10 life for bearings shall be at least 100,000 hours at the maximum operating conditions.

G. Removable wearing rings (when applicable) shall be provided on both suction cover and impeller and shall be constructed of hardened 400 Series stainless steel or high chrome steel ASTM A743 with minimum Brinell Hardness of 350 and 400 for pumps having enclosed impellers. Wear rings shall have a minimum of 50 BHN difference to prevent galling.

H. Back Cover - The back cover shall be constructed of cast iron and shall be designed to provide a self-centering fit with the casing.

I. Pump and Motor Supports - The pump and motor shall be supported as shown on the Drawings.

J. Moisture Detection - The unit shall be supplied with a leakage sensor for the detection of water in the moisture sensing chamber or stator housing. Detection of moisture shall signal an alarm and require an inspection, but not an immediate shutdown of the pump. For dry pit submersible pumps with closed loop cooling, moisture detection may be located in a chamber above the upper mechanical seal.

K. Thermal Protection - Each phase of the motor shall contain a temperature monitor switch imbedded in the motor windings. Thermal switches shall be connected in series. Should the thermal switches open, the motor shall stop and activate an alarm in the pump control panel.

2.01 ACCESSORIES

- A. Gauges - Suction and discharge gauges shall be provided by Contractor for each pump in accordance with Section 11300, Pumping Equipment - General.

2.02 MOTORS AND DRIVES

- A. Pumps shall be supplied with motors designed to operate on 460-volt, 3 phase, 60 Hertz power. Maximum motor speed shall be 1800 rpm. Motors shall have a minimum service factor of 1.15. All motors shall be suitable for constant speed operation. The minimum efficiency shall be in accordance with the performance requirements specified herein. The motor shall be of the squirrel-cage induction design, NEMA type B.
- B. Shall be in a watertight housing and be capable of running continuously at full load in a totally dry condition, a continuously submerged (or partially submerged) condition, or a condition where the conditions change from submerged (or partially submerged) to dry. The factory installed cooling system shall be designed by the manufacturer to permit operation as described in this section.
- C. The pump power cable shall be a minimum 50 feet and the moisture and thermal protection cables shall be a minimum of 50 feet.
- D. Provide for all three-phase motors, 7-1/2 HP or larger, 1200, 1800, and 3600 rpm (nominal), 60 Hertz, constant single speed (not VFD controlled), squirrel cage induction-type, which do not have a minimum power factor of 85 percent. Motors which cannot meet this criteria shall have power factor correction capacitors, switched integrally with the motors (unless otherwise required by either the motor or starter manufacturer), which will bring the power factor up to a minimum of 90 percent.

2.03. CONTROLS

- A. Pump controls shall be furnished and installed by the Contractor as stated in Section 16484, 17095 and as shown on the Drawings.
- B. All potentiometers and output meters shall be calibrated to indicate pump capacity (gpm) over the entire range of available motor speeds.

2.04. SOURCE QUALITY CONTROL

- A. The equipment shall be shop assembled and tested according to Section 11300.

2.05. FABRICATION REQUIREMENTS

- A. Surface preparation, shop painting and field painting and other pertinent detailed painting specifications shall be in accordance with Section 09900.
- B. Grease fittings shall be standardized in accordance with Section 01640.

2.06. FACTORY TESTING

- A. Each pump shall be factory tested per ANSI/HI 1.6 for head, flow and efficiency.
- B. The factory tests shall demonstrate that the proposed pumps can operate under the conditions defined in Article 1.04 and in Sections 01640 and 11300.
- C. Engineer and Owner reserve the right to witness the factory test on each pump at their own expense before the pumps are assembled for shipment to the project site. The pump manufacturer shall give Engineer ample notice of these tests so that Engineer can arrange to witness the tests.
- D. The manufacturers shall submit certified copies of the test data to Engineer and receive approval of the test data before shipment of the pumps to the site. Include results of factory testing in the O&M Manual.
- E. Final acceptance of the equipment will be dependent upon the satisfactory operation and performance after installation.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Furnish and install the pumping equipment according to manufacturer's instructions and Sections 11300 and 01640.
- B. Furnish all necessary oil and grease for initial operation and for the one-year warranty period.
- C. Contractor shall field verify all dimensions and elevations and shall notify Engineer of any specific differences.

3.02. FIELD TESTING AND INITIAL OPERATION

- A. Perform startup, field testing, and initial operation of equipment in accordance with requirements specified in Section 01640 and as specified herein unless otherwise noted.
 - 1. Preliminary field testing.
 - 2. Functional testing.
 - 3. Startup.
- B. Field testing of equipment shall be conducted in the presence of the Engineer and the equipment manufacturer, or their approved and certified representative.

- C. Final acceptance shall be based on successful demonstration that each pump meets the specified performance requirements, and that each motor is not overloaded, in all normal operating modes.
 - 1. That the units have been properly installed and are in proper alignment.
 - 2. That the units operate without overheating or overloading of any parts and without objectionable vibration.
 - 3. That there are no mechanical defects in any of the parts.
 - 4. That the pumps can deliver the specified flow rate and quantity at the rated speed. All Functional Tests shall be conducted with clean water unless otherwise noted. Contractor shall provide all temporary flow measurement devices as necessary to achieve accurate measurement of the pumped flow during the field tests.
 - 5. That the pumps can pass the type of liquid for which the pumps are to be used.
- D. Adjust, repair, modify, or replace any equipment components that fail to meet specified performance requirements.

3.03. MANUFACTURER'S SERVICES

- A. Equipment Installation, Startup, and Field Testing
 - 1. The equipment manufacturer shall provide the services of a qualified field service representative to inspect the installation and supervise the startup, field testing and initial operation of the equipment provided.
 - 2. The services provided shall conform to the minimum durations and other requirements specified in Section 01640.
 - 3. The manufacturer's field service representative shall submit written certification to the Contractor and Engineer that the equipment has been installed and tested to the manufacturer's satisfaction, that all final adjustments have been made, and that the equipment is ready for startup and initial operation.
- B. Training Services
 - 1. The equipment manufacturer shall provide the services of a qualified representative to train the Owner's personnel in proper procedures for operation and maintenance of the equipment provided.
 - 2. The training services provided shall conform to the minimum durations and other requirements specified in Section 01640.

3.04. EQUIPMENT WARRANTY

- A. The manufacturer shall warranty that the equipment provided under this Section shall be free of defects in materials and workmanship and shall meet the specific performance requirements when operated in accordance with the manufacturer's written operation and maintenance instructions.
- B. The equipment warranty shall be for a period of either five years starting on the date of equipment delivery to the site, or one year starting on the date of Substantial Completion of construction, whichever is shorter.

END OF SECTION

SECTION 15060

ABOVEGROUND PROCESS PIPING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish, install, and test aboveground process piping complete with all fittings, appurtenances and all other required accessories in accordance with the Contract Documents.

1.02. REFERENCES

- A. Ductile Iron and Gray Iron Pipe

Handbook of Cast Iron Pipe - Cast Iron Pipe Research Association (CIPRA)	CIPRA Standard for Flanged Pipe With Threaded Flanges
ANSI A21.4/AWWA C104	Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water
ANSI A21.10/AWWA C110	Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
ANSI A21.15/AWWA C115	Flanged Ductile Iron and Gray Iron Pipe With Threaded Flanges
ANSI A21.50/AWWA C150	Thickness Design of Ductile Iron Pipes
ANSI A21.51/AWWA C151	Ductile Iron Pipe Centrifugally Cast in Metal Molds and Sand Lined Molds for Water and Other Liquids
ASTM A126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A536	Ductile Iron Castings
ANSI/AWWA C606	Grooved and Shouldered Joints

- B. Plastic Pipe and Fittings

ANSI/AWWA C900	Poly (Vinyl Chloride) (PVC) Pressure Pipe 4-inch through 12-inch for Water
AWWA C901	Polyethylene (PE) Pressure Pipe and Tubing 1/2-inch through 3-inch for Water Service
AWWA C902	Polybutylene (PB) Pressure Pipe, Tubing and Fittings, 1/2-inch through 3-inch for Water
ASTM D1248	Polyethylene Plastics Molding and Extension Materials (High Density Type III Black Polyethylene Pipe)
ASTM D1784	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedule 80
ASTM D1785	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM D2241	Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)

ASTM D2464	Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2467	Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2564	Solvents Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
ASTM D2581	Polybutylene (PB) Plastics Molding and Extrusions Materials
ASTM D2657 and D3261	Butt Heat Fusion and Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM D2672	Solvent Cement Joint Sockets or Belled PVC Pressure Pipe
ASTM D2774	Underground Installation of Thermoplastic Pressure Piping
ASTM D3139	Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals
ASTM D3350	Polyethylene Plastics Pipe and Fittings Materials
ASTM F477	Elastomeric Seals, (Gaskets) for Joining Plastic Pipe

C. Steel Pipe and Fittings

ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
ASTM A120	Pipe, Steel, Black and Hot-Dipped, Zinc Coated (Galvanized) Welded and Seamless for Ordinary Uses
ASTM A181	Forgings, Carbon Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless for Ordinary Uses
ASTM A182	Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves
ASTM A183	Carbon Steel Track Bolts and Nuts
ASTM A234	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
AWWA C200	Steel Water Pipe and Fittings for Pipe 6-inch Inside Diameter and Larger
AWWA C203	Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot Applied
AWWA C205	Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4-inch and Larger - Shop Applied
AWWA C206	Field Welding Joints in Steel Pipe
AWWA C208	Steel Fittings

D. Copper Pipe and Fittings

ASTM B32	Solder Metal
ASTM B88	Copper Pipe; Type L for Inside Service
ASTM B584	Copper Alloy Sand Castings for General Applications
ASME/ANSI B16.18	Cast Copper Alloy Solder Joint Pressure Fittings

E. Stainless Steel

ASTM A240	Heat Resisting Chromium and Chromium Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels
ASTM A778	Specifications for Welded Unannealed Austenitic Stainless Steel Tubular Products
ASTM A774	Specifications for as Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures
ASME/ANSI B36.19	Stainless Steel Pipe
ASME/ANSI B16.11	Forged Steel Fittings, Socket-Welding and Threaded
ASTM A312	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A403	Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings

F. Other

ASTM A47	Malleable Iron Castings
ASTM A338	Malleable Iron Flanges, Pipe Fittings and Valve Parts for Railroad, Marine, and Other Heavy Duty Service at Temperatures up to 650 degrees F (345 degrees C)
ASTM E84/ NFPA 225/UL 723	Surface Burning Characteristics of Building Materials
NSF/ANSI 61	Drinking Water System Components – Health Effects
OSHA	Occupational Safety and Health Act
6 CRR-NY 599	Official Compilation Of Codes, Rules And Regulations Of The State Of New York Title; 6. Department Of Environmental Conservation; Chapter V. Resource Management Services; Subchapter E. Water Regulation; Part 599 Standards For New Or Modified Hazardous Substance Storage Facilities

1.03. SUBMITTALS

A. Provide in accordance with Sections 01300, Submittals; 01640, Equipment-General; and as supplemented herein. Submittals shall include, but not be limited to, the following:

1. Shop Drawings

- a. Shop drawings shall indicate conformance to applicable ASTM/AWWA codes, pipe material, sizes, class, dimensions, joint type, features and accessories.
- b. Submit chemical compatibility data for pipe, gaskets, solvent welding cements, and other parts of chemical feed piping materials.

- c. Provide certification of UV inhibitors in plastic piping (CPVC, PVC, HDPE, etc.) that will be outdoors and above ground or inside process tanks.
2. Layout Drawings - Show complete piping layout, including materials, sizes, classes, locations, dimensions, supports, adapters, couplings, expansion joints, and hanger details. Joints shall be provided at all locations require by the Contract Documents, including all locations shown on the Contract Drawings. Piping layout drawings shall be submitted separately from piping product shop drawings.
3. Welder Certifications - Provide current welder certificates of welders that are used in fabrication, erection, and installation. Each welder shall have a permanent identifying mark next to each weld.
4. Samples - Provide samples of piping when requested by Engineer.
5. Shop Test Results - Submit test results, if shop testing is required.
6. Certification of equipment compliance.
7. Field Testing Results - Submit copies of leak test reports under Sections 02674, Pressure Testing of Water Distribution Systems; 02735, Leakage Tests of Sewers; or 02741, Pressure Tests of Force Mains.

1.04. PROJECT RECORD DOCUMENTS

- A. Provide in accordance with Section 01700, Closeout and Record Documents, and as supplemented herein.
 1. Submit marked up record plans including record location of pipe connections, valves, cleanouts, bends, tees, manholes, and rim and invert elevations.
 2. Invert elevations shall be the measurement of the pipe invert at a point where the pipe enters or exits a structure.
 3. Identify and locate on record drawings during construction the discovery of exposed uncharted existing utilities and services.

1.05. FIELD MEASUREMENTS

- A. Prior to the start of construction, field verify measurements and elevations for existing conditions, piping, and equipment are as shown on the Contract Drawings. Notify Engineer of specific differences.
- B. Prior to the start of construction, verify by exploratory excavations that existing underground utility locations and elevations are as shown on Contract Drawings prior to installation of crossing pipes and confirm location and elevation of uncharted utilities in the vicinity of proposed work. Notify Engineer of location and elevation and allow Engineer sufficient time to determine any changes required as a result of such exploratory excavation, prior to start of construction.

1.06. COORDINATION

- A. Coordinate the work with Owner where operation of existing structures and treatment facilities are affected.
- B. Coordinate the work with other prime contracts.

PART 2 PRODUCTS

2.01. GENERAL

- A. All products included in this section shall conform to the requirements of the standard specifications referenced herein.
- B. Pipe material, pipe class and pipe sizes shall be furnished and installed as listed in the pipe schedule herein and/or as shown on the Drawings.
- C. Non-potable water, plant water and potable water piping materials shall be as specified in Section 15410, Plumbing Piping, unless otherwise noted on the Drawings.

2.02. DUCTILE IRON

- A. Ductile iron pipe shall conform to AWWA C151/ANSI A21.51. Ductile iron pipe shall be rated for a minimum water pressure of 150 psi and be minimum Class 53.
- B. Ductile iron pipe and fittings shall be double cement lined and seal coated inside and out in accordance with ANSI 21.4/AWWA C104.
- C. Fittings shall conform to ANSI A21.10/AWWA C110.
- D. Digester Box Ductile Iron Overflow Rings
 - 1. For establishing any desired overflow water level in digesters.
 - 2. Shall be of the quantity, diameter, and length as shown on the Drawings.
 - 3. Support pipe, counterbored for overflow ring, shall be provided as shown on the Drawings.
 - 4. Manufacturer shall be McWane Ductile or equal.
- E. Joints - All joints shall be Type I, except where Type II are shown on the Contract Drawings.
 - 1. Type I - Fittings shall be furnished with flanged joint. The type of joint shall meet the following applicable requirements:
 - a. Flanges shall be screw-on type flanges and the face of the flange shall be machined after installation of the flange onto the pipe.
 - b. No raised surface is allowable on cast iron flanges.

- c. Flanges shall be 125-lb. ASA flanges rated for a maximum working pressure of 150 psi.
 - d. The fittings shall be of standard lengths given under the ANSI Specification B16.1, unless otherwise noted.
 - e. The pipe lengths shall be fabricated to meet the requirements of the Contract Drawings.
2. Type II - Pipe and fitting shall be provided with grooved end pipe joint.
- a. Grooved end pipe couplings shall consist of housing, gasket and bolts.
 - b. Housing shall be either malleable iron or ductile iron castings.
 - c. Gaskets shall be halogenated butyl, suitable for use with ductile iron pipe, and shall be in accordance with manufacturers' recommendations.
 - d. Bolts and nuts shall be heat treated carbon steel of the oval track head design conforming to ASTM A183.
 - e. Couplings shall be installed in accordance with manufacturers' recommendations.
 - f. Fittings shall be ductile iron or cast iron with radius cut grooved ends and shall be supplied by manufacturer of pipe couplings.
 - g. Groove dimensions for pipe and fittings shall be in accordance with manufacturers' recommendations and AWWA C606 for rigid grooving dimensions.
 - h. Grooved end valves will not be allowed.
 - i. Wall, floor and deck sleeve diameters shall remain the same as shown on the Contract Drawings.
 - j. Contractor shall have a "cut grooving tool" located on site if grooved end pipe couplings are used in lieu of flanged joints.
 - k. The cut grooving tool is to be at the site during the major process piping installation for a minimum of 24 months.
 - l. The tool shall be suitable for cutting and grooving steel, cast iron and ductile iron pipe in sizes 2-inch through 30-inch diameter.
 - m. All groove cuts in piping and fittings shall be prime painted in accordance with Section 09900, Painting.
 - n. Pipe couplings shall be Style 31 Victaulic; Aeroquip Series 500 as manufactured by Gustin-Bacon-Napco; or equal.
 - o. Grooved end pipe and fittings will not be allowed within any process tank.

F. Glass Lining

1. Lining shall be applied only by a company experienced in the glass lining of pipe.
2. The glass lining shall be a specially formulated internal coating for handling sewage, grease, grit, scum and sludge in wastewater treatment plants.
3. The coating shall consist of special glasses and inorganic materials applied in a minimum of two coats, separately fired, to internal surfaces prepared by blasting.
4. Following application of the base coat, the coating shall be exposed to an appropriate maturing temperature at which point the glass fuses to the base metal, forming an integral molecular bond with the metal.
5. The resulting bond shall be sufficient to withstand a metal yield point of 0.001 inches per inch without damage to the glass.
6. Subsequent coating shall be processed in a similar manner, forming an integral molecular bond with the base coat.
7. The entire glass lining shall be from .008-inch to 0.12-inch thick.
8. It shall have a hardness of from 5 to 6 on the Mohs Scale, and a density of from 2.5 to 3.0 grams per cubic centimeter.
9. The glass lining shall be capable of withstanding a thermal shock of 350 degrees F without crazing, blistering or spalling.
10. Glass lining shall be resistant to corrosion by solutions of between PH-3 and PH-10 at 125 degrees F.
11. The glass lining shall show a weight loss of not more than 3 milligrams per square inch when tested according to ASTM Designation C283-54.
12. The glass lining shall be free from pin holes, crazing, or fishscales. Field inspection of glass linings shall consist of visual inspection by application of a strong light source at one end of a finished piece. Any evidence of pinholes, crazing, fishscales or excessive spalling from cutting operations shall be cause for rejection.
13. Cutting of glass-lined pipe shall be done in strict accordance with the glass lining company's recommendations.
14. Glass-lined pipe shall be as manufactured by US Pipe or equal. Fittings and joint types shall adhere to the specifications herein.
15. Glass lining of pipe shall be SG-14 as manufactured by US Pipe or approved equal.

2.03. PLASTIC

A. PVC

1. PVC pipe shall be ASTM D1785, Type 1, Grade 1 (PVC 1120) pressure pipe material conforming to ASTM D1784, Class Schedule 80.
2. Joint sockets for belled PVC pressure pipe to conform to ASTM D2672 and ASTM D2564 (solvent cements).
3. Socket type fittings for Schedule 80 PVC pipe to conform to ASTM D2467.

B. Chlorinated Polyvinyl Chloride (CPVC)

1. CPVC pipe shall conform to ASTM F441 and shall be Schedule 80 pressure pipe.
2. Class Schedule 80 solvent cement socket weld type joints shall be used on all CPVC pipe runs and fittings.
3. Socket type fittings for CPVC pipe shall be Schedule 80 and conform to ASTM F439.
4. Solvent cement for CPVC piping shall meet the requirements of ASTM F493. CPVC piping systems for sodium hypochlorite use shall be specifically designed for improved chemical resistance to sodium hypochlorite and shall be manufactured by IPS, Part No. 724, or equal.

C. Plastic Pipe Unions

1. Plastic pipe unions shall be provided on PVC and CPVC piping at all connections to equipment, tanks and valves; at all wall and floor penetrations; and as otherwise shown on the Contract Drawings.
2. All piping and fittings shall be of the same color and provided by the same manufacturer.
3. Pipe unions shall be manufactured with a threaded TFE drain nipple, temperature resistance up to 300 degrees F, pressure resistance up to 1,000 psi, and shall be resistant to chemicals, corrosion, and organic solvents.

- D. UV Light Protection - Outdoor pipes or those installed in open tankage shall have ultraviolet light inhibitors to protect pipes against degradation by UV light.

2.04. COPPER

- A. Copper pipe shall conform to ASTM B-88, Type L material.
- B. Fitting shall be socket-type in conformance with ASME/ANSI B16.18.
- C. Copper joints shall be soldered with a lead-free solder conforming to ASTM B32.

2.05. STAINLESS STEEL

- A. Stainless Steel Pipe and Fittings - Type 304L with 2-D finish conforming to ANSI 304L and ASTM A240-UNS Alloy S30403, ASTM A778, and ASTM A774.
- B. Joints - Welded. No fabricated fittings, tees, or wyes will be accepted.
 - 1. All flanges and flanged systems shall be stainless steel.
 - 2. Flanges shall be provided, as a minimum, on stainless steel piping: at all connections to valves and equipment; on the tees for each drop pipe; and as otherwise shown on the Drawings.
 - 3. Gaskets for process air piping shall be Viton. Gaskets for digester gas piping shall be neoprene.
 - 4. Piping system shall be inspected after fabrication and checked for irregularities. Flanges, if they are warped, shall be corrected in the proper manner acceptable to the Engineer.
- C. Minimum thickness for stainless steel piping and fittings shall be Schedule 40S.
- D. Welding
 - 1. Welder qualification certificates shall meet the minimum code requirement for duration of qualification, clearly stating the type of weld and position for which the welder is qualified, and shall bear the signature of an AWS-authorized weld inspector.
 - 2. All welding of stainless steel shall be by the shielded arc, inert gas, MIG or TIG method.
 - 3. Filler wire shall be added to all welds to provide for a cross-section of weld metal equal to, or greater than, the parent metal.
 - 4. Butt welds of weld metal equal to, or greater than, the parent metal.
 - 5. Butt welds shall have full penetration to the interior surface and gas shielding shall be provided to the interior and exterior of the joint.
 - 6. All welds shall have a surface finish equal to the smoothness of a 2-D sheet finish.
 - 7. Interior weld beads shall be smooth, evenly distributed, with an interior projection not exceeding 1/16-inch beyond the I.D. of the pipe or fitting.
 - 8. SS welded joints will be radiographed at the Engineer's discretion and at the Owner's cost. Radiographs to be interpreted in accordance with AWS, ANSI B31.1. All welds shall have identifying marks with date and location of weld.
 - 9. Cut out and replace welds of poor or doubtful quality with satisfactory welds. Each replacement weld shall be retested at the Contractor's expense.

10. If tested welds are found to be of poor or doubtful quality at greater than 25 percent, Contractor shall be responsible for paying for the testing of additional welds until such a time that the percentage of poor or doubtful welds falls below the 25 percent threshold. The first four tests shall be assumed to be at the Owner's expense and subsequent test after the 25 percent threshold is met.

E. Couplings and Expansion Joints

1. Where expansion couplings are shown on air piping on the Contract Drawings, BRICO Industries Depend-O-Lok F x E (Fixed by expansion) couplings shall be used.
 - a. Couplings shall allow one end to move freely while the other is restrained. Unless otherwise noted, expansion couplings shall only be used on air lines between supports which restrain the pipe from non-axial movement. Expansion joints shall be used to allow thermal expansion/contraction in air piping where one of the adjacent pipe ends is not horizontally restrained against non-axial movement.
 - b. Minimum allowable expansion/contraction in joint shall be 1-5/8 inches per joint.
 - c. Couplings shall be Type 316 stainless steel arched band type couplings of the same thickness (or greater) as the air main.
 - d. Couplings shall have single piece housing with ID equal to OD of pipe and provide full circumferential bearing against welded end rings on pipe.
 - e. Couplings shall have silicone gaskets with one-piece cross section suitable for working temperatures to 300 degrees F.
 - f. Coupling sealing plates, bolts, nuts, washers, and ring shall be Type 316 stainless steel.
 - g. Coupling shall attach to plain end pipe with external weld beads ground smooth and compatible with Type 304L stainless steel restraint rings shop welded to the piping for the fixed-end couplings.
 - h. The fixed end couplings shall be installed next to adjacent fixed pipe support.
2. Where expansion joints are shown on air piping on the Contract Drawings, Mercer Flexmore Style 450 heavy duty expansion joints shall be used.
 - a. Expansion joints shall be single arch heavy duty rubber spool-type with Type 304 stainless steel 125 lb. flanges and 3/8-inch split Type 304L stainless steel retainer rings and Type 316L stainless steel bolts with washers. Arch shall be unfilled.
 - b. Minimum axial compression of expansion joint shall be 1-3/4 inch and minimum axial elongation shall be 3/4 inch. Minimum angular deflection allowable shall be 15 degrees F.

- c. Expansion joint arch material shall be Butyl (Chlorobutyl) suitable for working temperature to 300 degrees F.
- 3. Where expansion joints are shown on liquid piping on the Contract Drawings, provide bellows type expansion joints by U.S. Bellows, or equal.
 - a. Expansion joint manufacturer shall select the appropriate expansion joint for the application based upon the piping system layout, flowing medium, pressure, and temperature.
 - b. The bellows shall be designed in accordance with the design equations for unreinforced and reinforced bellows as specified in *Section C of the Standards of the Expansion Joint Manufacturers, Fifth Edition, 1980* including all current addenda.
 - c. If reinforcement of the bellows is necessary for pressure, the reinforcing rings shall be formed integrally with the bellows. No bolted-on control devices such as equalizing rings shall be used.
 - d. Expansion joints weighing more than 500 lbs. shall be provided with lifting lugs. Each expansion joint shall be provided with a stainless steel nameplate indicating the date of manufacture, design rating of the expansion joint and any other information required by the purchase order.
 - e. Bellows shall be A240-T304 stainless steel, with 150 lb ANSI B16.5 flanges. Pipe shall conform to ASTM A53/A106. Liners shall be A240-T304 stainless steel, and covers, tie rods, hinges, and gimbals shall be carbon steel.
 - f. Bellows shall be formed from seamless or longitudinally butt welded cylinders. If welded, the butt weld must be planished to within 10 percent of the original sheet thickness. Bellows shall be provided in the as formed unannealed condition. Bellows convolutions shall be "U"-shaped and formed with an even pitch and height. Circumferential welds joining one convolution to another shall not be used. All welding shall be in accordance with ASME Section IX or AWS D1.1. End connections are to match the adjacent piping.
 - g. When the expansion joint is supplied with an internal sleeve, the flow direction must be indicated and be plainly visible on the outside of the joint. All surfaces of the expansion joint shall be thoroughly cleaned of dirt, grease, oil and all foreign matter. Shipping bars shall be installed on the expansion joint to maintain the proper shipping length. Shipping bars are to be painted yellow. Each expansion joint shall be tagged with recommended installation instructions.
- F. Fittings - Fittings shall be butt weld type manufactured in accordance with ASTM A774 of the same grade (alloy) and in the same thickness as the pipe.
 - 1. Long radius elbows shall be used for all bends unless otherwise noted on the Contract Drawings, and shall have a centerline to end of elbow dimension of 1.5 times the nominal diameter of the pipe.

2. Long radius elbows up to 24-inch diameter shall be smooth flow type.
 3. All short radius, special radius, and reducing elbows; and long radius elbows greater than 24-in diameter shall be of mitered construction with at least five miter sections for 90-degree bends, three mitered sections for 45- and 60-degree bends, and two mitered sections for 30-degree and smaller bends
 4. Reducers may be straight tapered, cone type. Tees, crosses, laterals and wyes may be shop fabricated from the specified pipe. No field fabricated fittings, tees, wyes will be accepted.
 5. The finish on the completed pipe and fittings shall be as specified in ASTM A312 and A403, respectively.
 6. All fittings shall be by the same manufacturer.
- G. Piping system shall be tested after fabrication and checked for irregularities.
- H. After installation, Contractor shall wash and rinse all foreign matter from the piping surface.
1. If rusting of embedded iron occurs, the Contractor shall pickle the affected surface with Oakite Deoxidizer SS, Bradford Derustit SS-3, or equal, scrub with stainless steel brushes and rinse clean.
 2. Flanges, if they are warped, shall be corrected in the proper manner acceptable to Engineer.

2.06. HIGH DENSITY POLYETHYLENE (HDPE)

- A. High molecular weight (330,000 minimum) polyethylene pipe shall meet the requirements of ASTM D1248, F-714, Grade P3408, Type III, Class C, and ASTM D3035.
- B. All HDPE pipe and fittings shall be SDR 11. All HDPE pipe and fittings greater than or equal to 4 inches in diameter shall comply with DIPS standards.
- C. Joints shall be butt-heat fusion type.
- D. HDPE pipe shall be Plexco EHMW PE, Driscopipe 8600 Series, or equal.

2.07. WELDED STEEL

- A. Steel water or process pipe shall conform to AWWA C200.
- B. Steel water or process pipe material shall be Schedule 80 ASTM A53/Type E or S, Grade A, ASTM A134, ASTM A135, all grades, and ASTM A139, all grades and diameters.
- C. Longitudinal joints shall be shop welded and shall be made either with straight seams having not more than 2 to each circumference, or shall be made by the spiral-weld process.
- D. The steel pipe shall be designed not only for internal pressure but also for external load consistent with 5 feet of earth cover including any live load and impact factor.

- E. Steel pipe ends shall be one of the following types:
 - 1. Type 1 - Square end rounded and true, shall be used with mechanically coupled field joints.
 - 2. Type 2 - Beveled ends shall be used for field welded joints. Plain end pipe shall be beveled on the outside at an angle of 30 degrees with a root face at the end of the pipe of 1/16-inch, with the allowance of $\pm 1/32$ inch. This angle is measured from a line drawn perpendicular to the axis of the pipe.
- F. Fittings shall conform to the AWWA Standard C208 for dimensions for fabricated steel water pipe fittings. All bend joints with mechanical couplings shall be 1 foot longer than the standard length which shall be required if the joints of the bend are butt-welded.
- G. Joints shall be made with butt-weld. Pipe joined by welding shall be made by a single butt-weld made on the outside of the pipe. Butt-weld shall conform to the AWWA Standard C206 for field welding of steel water pipe.
- H. All pipe and fittings used for process piping shall be lined and coated as specified herein.

2.08. ALUMINUM

- A. Piping to be either square or round extruded anodized aluminum system specifically designed for compressed air service. Aluminum piping system to comply with ASME B31.1 and 31.3.
- B. Working Pressure - Coordinate with BAF pre-selected shop drawing.
- C. Pipe fittings, connectors, wall brackets, and supports to be designed specifically for the aluminum piping system installed.
- D. Compressed air isolation valves to be from the same manufacturer as the selected aluminum piping.
- E. Piping system to be by Legris Transair, or equal.

2.09. JOINTS IN ABOVEGROUND PIPING

- A. Unless otherwise noted, joints for aboveground piping shall conform to the following specifications.
 - 1. Flanged Joints
 - a. Shall be brought to exact alignment and all gaskets and bolts or studs inserted in their proper places.
 - b. Bolts or studs shall be uniformly tightened around the joints.
 - c. Where stud bolts are used, the bolts shall be uniformly centered in the connections and equal pressure applied to each nut on the stud.

- d. Gaskets shall be ring type, minimum 1/8-inch thick.
 - 1) Material shall be neoprene rubber for general liquid service and digester gas piping.
 - 2) Material shall be Viton for general air service.
 - e. Flanges shall conform to AWWA Standard C115 (ANSI A21.15) with bolts provided in the size and number called for and in accordance with the American Standard with hexagonal nuts.
 - f. For bolt sizes and lengths, the "Handbook of Cast Iron Pipe" should be consulted.
 - g. Bolts and fasteners for exterior exposed or submerged flanged pipe fittings at process tanks shall be Type 316 stainless steel.
 - h. Bolts and fasteners for flanged pipe fittings located inside structures or otherwise protected shall be standard A36 steel. Steel bolts shall be field primed and painted with the same coating system the adjacent piping receives.
2. Screwed Joints
- a. All screwed joints shall have threads conforming to ANSI B2.1, made with the appropriate paste of jointing compound, depending on the type of liquid to be processed through the pipe.
 - b. All pipe up to and including 1-1/2 inches diameter shall be reamed to remove burr and stood on end and well pounded to remove scale and dirt.
 - c. Wrenches on valves and fittings shall be applied directly over the joint being tightened.
 - d. Pipe in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot.
 - e. Joints in plastic piping shall be made with compounds recommended by the manufacturer.
 - f. Joints in all piping used for chlorine gas lines shall be made up with glycerine.
3. Soldered Joints
- a. Shall have the burrs removed and both the outside of pipe and the inside of fittings shall be thoroughly cleaned by proper tools recommended for that purpose.
 - b. Flux shall be applied to both pipe and inside of fittings and the pipe placed into fittings and rotated to insure equal distribution of flux.
 - c. Joints shall be heated and solder applied until it shows uniformity around the end of joints between fitting and pipe.

- d. All joints shall be allowed to self-cool to prevent the chilling of solder.
 - e. Combination flux and solder paste manufactured by a reputable manufacturer is acceptable.
4. Welded Joints
- a. Shall be made by competent operators in a first-class workmanlike manner, in complete accordance with ANSI Standard B31.1.
 - 1) Welding electrodes shall conform to ANSI Standard W3.1 and welding rod shall conform to ANSI Standard W3.2
 - b. Employ only skilled welders capable of meeting the qualification tests for the type of welding which they are performing.
 - c. Tests, if ordered by Engineer or otherwise required, shall be made at the expense of the Contractor.
5. Solvent-Welded Joints
- a. In plastic piping shall be accomplished in strict accordance with the pipe manufacturer's recommendations, including necessary field cutting, sanding of pipe ends, joint support during setting period, etc.
 - b. Care shall be taken that no droppings or deposits of adhesive or solvent material remain inside the assembled piping.
 - c. Solvent material shall be compatible with the pipe itself, being a product approved by the pipe manufacturer.
 - d. Solvent cement for PVC and CPVC piping shall be resistant to the chemicals carried by the piping for which it is being used and shall conform to ASTM D2564.
 - e. Contractor shall submit written certification from the solvent cement manufacturer that the cement is compatible with the chemicals carried by the PVC or CPVC piping for which it is being used. Certifications are not required for plastic pipe carrying water or organic polymers. Certification shall be supplied prior to the use of the cement.
6. No-Hub Joints - Fittings and all parts of the clamp assembly used in joining "hubless cast iron sanitary systems" for soil, waste, vent and house or building sewer lines shall bear the registered insignia "C" or "C No-Hub" indicating that these items used in the sanitary system comply with the Cast Iron Soil Piping Institute Standard 301-69T and ASTM Standard C564.

2.10. LININGS AND COATINGS

A. Inside of Pipe (Ductile Iron and Steel Pipe Only)

1. Pipe and fittings for all process and water lines shall be double cement lined and seal coated in accordance with ANSI 21.4/AWWA C104.
2. Air piping and fittings shall not be lined

B. Outside of Pipe

1. All interior ductile iron and steel pipe and fittings shall be factory primed and field coated per Section 09900, Painting.
2. Stainless Steel – All underground stainless steel pipe and fittings used for process air piping shall be protected with the following corrosion control methods:
 - a. Shop coated with a paint system in accordance with Section 09900, Painting, and the paint manufacturer's recommendations.
 - b. Installed with insulating flanges to provide dielectric isolation between aboveground and underground air piping utilizing dielectric gaskets, bolt sleeves, and bolt washers. Isolation flanges shall be manufactured by Barlow Corporation, or equal. Dielectric gaskets, sleeves, and washers shall be suitable for use at 300 degrees F.
 - c. Contractor shall furnish a National Association of Corrosion Engineering galvanic, cathodic protection system for the underground stainless steel air piping with 30-year design life, as manufactured by PSG Corrosion Engineering, Inc., or equal. Submit certification of cathodic protection system design in accordance with the Special Provisions.
3. Plastic piping which is not UV resistant and is exposed to sunlight or submerged within tanks shall be coated with UV- resistant primer and outer coating.

2.11. IDENTIFICATION

A. Each pipe length and fitting shall be clearly marked with the following:

1. Manufacturer's name and trademark.
2. Nominal pipe size and class.
3. Material designation.

B. Contractor shall furnish and install pipe labels in accordance with Section 10426, Pipe Identification.

2.12. HANGERS AND SUPPORTS

- A. All piping shall be adequately supported and braced by means of adequate hangers, concrete piers, pipe supports, brackets, or otherwise as may be required by the location. Refer to Section 15140, Supports and Anchors.

2.13. INSULATION

- A. Piping shall be insulated in accordance with Section 15260, Piping Insulation.

2.14. SLEEVES AND CASTINGS

- A. All piping passing through walls and floors shall be installed in sleeves or castings accurately located before concrete is poured, or placed in position during construction of masonry walls.
 - 1. Sleeves passing through floors shall extend from the bottom of the floor to a point 3 inches above the finished floor, unless shown otherwise on the Contract Drawings.
 - 2. Waterstop flanges are required on all sleeves located in floors or walls which are continually wet or under hydrostatic pressure on one or both sides of the floor or wall, where shown on the Contract Drawings, and on all sleeves penetrating walls of areas designed on the Contract Drawings as "gastight."
 - 3. Sleeves shall be black steel pipe, or fabricated steel in accordance with details shown on the Contract Drawings.
 - 4. Steel sleeves shall be fabricated of structural steel plate in accordance with the standards and procedures of AISC and AWS.
 - 5. All steel wall and floor sleeves shall receive a commercial sandblast cleaning, and all surfaces shall be painted in accordance with Section 09900, Painting.
 - 6. The annular space between the installed piping and sleeve shall be completely sealed against a maximum hydrostatic (or gas) pressure of 20 psig with a modular mechanical seal consisting of interlocking synthetic rubber links connected by stainless steel bolts and nuts with pressure plates under each end.
 - 7. Tightening the bolts shall compress the EPDM lines causing them to expand and form a continuous, airtight, watertight seal between pipe and sleeve. The seal shall be "Link-Seal," as manufactured by the Thunderline Corporation, Wayne, MI; or equal.
 - 8. Seal type, size and installation thereof shall be in strict accordance with the manufacturer's recommendations.
 - 9. In general, sleeves installed in walls, floors or roofs against one side of which will develop a hydrostatic (or gas) pressure, or through which leakage of liquid will occur, shall be so sealed.
 - 10. Sleeves through fire/smoke walls and floors shall be installed per NFPA. Seal all cracks and voids with fireproof sealant.

11. Castings shall be used on process piping through new walls and slabs where shown on the Contract Drawings. Castings size, wall thickness, joint type, and material shall match that of the adjacent piping, unless otherwise noted.
- B. Refer to the standard details on the Contract Drawings for additional requirements and wall, floor, and deck sleeve details
- C. If not shown on the Contract Drawings, the Contractor shall submit to the Engineer the details of the sleeves he proposes to install.

2.15. FLUSHING CONNECTIONS AND DRAIN TAPS

- A. Flushing connections and drain taps shall be installed as shown on the Drawings and specified herein. Refer to the Flushing and Drain Connection Detail on the Drawings for additional requirements.
- B. Each flushing connection shall consist of an eccentric blind flange tapped for 1-1/2-inch IPS, a 1-1/2-inch short nipple, and a 1-1/2-inch ball valve. All nipples and fittings shall be Schedule 80, Type 316 stainless steel.
- C. Ball valves shall be provided with a 1-1/2-inch IPS to 1-1/2-inch stainless steel quick disconnect female hose coupler.
 1. Female hose couplers shall be provided with appropriate threads or adapters and any necessary nipples to make a leak-proof seal when attached to the ball valves.
 2. Hose couplers shall be Ever-Tite; OPW Kamlock; or equal.
 3. Valves shall be in accordance with Section 15100, Aboveground Process Valves.
- D. Drain taps shall be provided at all new and existing pump suction and discharge piping. Taps shall be 1-1/2-inches IPS, a 1-1/2-inch short nipple and a 1-1/2-inch ball valve.

2.16. COUPLINGS AND ADAPTERS

- A. General
 1. Where alternative couplings are not shown on the Contract Drawings, flanged coupling adapters shall be used to join process piping to all pump flanges.
 2. Adapters shall be restrained to process piping by the use of stainless steel tie rods. Refer to the Contract Drawings for additional tie rod requirements.
 3. Couplings and/or adapters shall be provided by the Contractor for the alignment of similar types of pipe or connecting dissimilar pipe materials as required in accordance with the details shown on the Contract Drawings.
 4. All new to existing connections shall be restrained in accordance with the detail shown on the Contract Drawings.
 5. Unions shall be provided adjacent to all pumps, tanks, valves and other pieces of equipment where soldered, cement welded, or screwed joints are utilized.

6. Type 316 stainless steel bolts shall be used on all pipe adapters.
 7. Where couplings and adapters are to be used they shall be installed in complete accordance with the manufacturer's recommendations
- B. Flanged Coupling Adapters - Dresser Style 128W, Smith-Blair 913, or equal.
- C. Dismantling Joints - Romac Style DJ400, Smith-Blair 975, or equal.
- D. Mechanical Couplings - Dresser Style 38, Smith-Blair 411, or equal.
- E. Reducer Couplings
1. Dresser Style 62, or equal.
 2. When joining ductile iron pipe to existing reinforced concrete pipe, Contractor shall field verify O.D. of RCP and coordinate with coupling manufacturer for exact sizing. Contractor shall clean, grind, and smooth RCP for proper sealing of gasket.
- F. RCP to PCCP Follower Ring Adapter
1. RCP to PCCP follower ring adapters shall be supplied by the same manufacturer as the PCCP.
 2. The follower ring adapter shall connect to the PCCP using the same joint type scheduled for the PCCP.
 3. The follower ring adapter shall be designed to provide a pressure tight connection to the exterior surface of the RCP.
 4. When joining PCCP to existing RCP, Contractor shall field verify O.D. of RCP and location of bells on the RCP and coordinate with PCCP manufacturer for exact sizing. An appropriate length of PCCP shall be provided as required to avoid bells on the RCP. Contractor shall clean, grind, and smooth RCP for proper sealing of gasket in accordance with the manufacturer's recommendations.
 5. The follower ring adapter shall be installed in accordance with the manufacturer's recommendations.

2.17. STRUCTURAL EXPANSION JOINTS

- A. Mechanical couplings shall be installed on all piping and conduit wherever such piping crosses a structural expansion joint.
1. A 1/8-inch gap shall be left between adjacent lengths of pipe with a Dresser Style 38; Smith-Blair 411; or equal coupling joining the piping.
 2. Piping shall be supported by pipe supports each side of the mechanical coupling so that the coupling transmits no loads.

3. Contractor shall provide permanent restraints for all mechanical couplings installed on piping at structural expansion joints. Refer to the Contract Drawings for additional details.
4. All restraint hardware to be supplied and installed in accordance with manufacturer's recommendations

PART 3 EXECUTION

3.01. PIPING EXAMINATION

- A. Verify that structures are complete enough to receive pipe.
- B. All pipe or fittings which have been damaged in transit or which are obviously deformed or refinished in any way shall be rejected, marked and removed from the site of the work.
 1. Any pipe or fitting which the Engineer suspects is improper for the job shall be temporarily rejected, marked and set aside for subsequent investigation to determine its conformity with the specifications.
 2. All pipe fittings and specials shall be carefully inspected in the field before installation.
 - a. Cracked, broken, warped, out-of-round, damaged pipe joints including damaged pipe lining or coatings or specials, as determined by the Engineer, shall be culled out and not installed.
 - b. Such rejected pipe shall be clearly tagged in such manner as not to deface or damage it, and the pipe shall then be removed from the job site by the Contractor at his own expense.

3.02. PIPING INSTALLATION

- A. All piping shall be installed by skilled workmen and in accordance with the best standard practice for piping installation.
 1. Proper tools and appliances for the safe and convenient handling and installing of the pipe and fittings shall be used.
 2. Great care shall be taken to prevent any pipe coating from being damaged on the inside of the pipe and fittings.
 - a. All pieces shall be carefully examined for defects and no piece shall be installed which is known to be defective.
 3. If any defective pieces should be discovered after having been installed, it shall be removed and replaced with a sound one in a satisfactory manner by the Contractor and at his own expense.
 4. Pipe and fittings shall be thoroughly cleaned before they are installed and shall be kept clean until they are accepted in the complete work.

5. All piping connections to equipment or tanks shall be provided with unions or coupling flanges located so that piping may be readily dismantled from the equipment or tank.
 6. At certain applications, Dresser or Victaulic couplings may also be used, subject to the Engineer's approval.
 7. All piping shall be installed in such a manner that it will be free to expand and contract without injury to itself or surrounding structures or equipment.
 8. All piping shall be erected to accurate lines and grades and shall be supported and braced against movement temporary or permanent.
- B. Where process piping assemblies connect to equipment, valves or tanks, such piping shall be rendered compatible with the approved equipment, valve or tank installed and any necessary modifications to the original piping shall be shown in scaled layout on appropriate shop drawings submitted to the Engineer.
- C. Piping connections to equipment shall be in accordance with the following:
1. Mating piping/equipment flanges shall be concentric to within a tolerance of 1/8 inch unbolted.
 2. Mating flange faces shall be parallel to within a tolerance of 1/2 the normal gasket thickness or 1/8 inch, whichever is less, unbolted.
 3. Flange face separation shall be no more than 1/8 inch beyond the normal gasket thickness or relaxed expansion joint length unbolted; nor less than the relaxed expansion joint length by more than 1/16 inch.
- D. Piping assemblies under 4-inch size shall be essentially supported on walls and ceilings, unless otherwise shown on the Contract Drawings, being kept clear of openings and positioned above "headroom" space.
1. Where practical, such piping shall be run in neat clusters, plumb and level along walls, and parallel to overhead beams.
- E. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- F. Field verify all dimensions and elevations. Notify Engineer of specific differences.
- G. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for installation and testing.
- H. Surface preparation and field painting shall be in accordance with Division 9 specifications.
- I. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- J. Isolate dissimilar metals by backpainting or with dielectric using stainless steel fasteners.

3.03. TESTING AND STARTUP

- A. Requirements for testing of water distribution are described in Section 02674, Pressure Testing of Water Distribution Systems.
- B. Requirements for testing gravity pipe are described in Section 02735, Leakage Tests of Sewers.
- C. Requirements for testing force mains are described in Section 02741, Pressure Tests of Force Mains.
- D. All process piping shall be tested in accordance with the procedures outlined below as required in the pipe schedule.
 - 1. Where a section of pipeline has multiple uses, the pipe shall be tested at the highest pressure required.
 - a. Procedure A shall consist of a 15-minute test at 100 psi followed by a 3-hour test at 50 psi.
 - b. Procedure B shall consist of a 1-hour test at 150 psi followed by a 2-hour test at 100 psi.
 - c. Procedure C shall consist of a 30-minute test at 50 psi.
 - d. Procedure D shall consist of an exfiltration test; the pipe is filled with clear water to provide a head of at least 5 feet above the top of the pipe at the highest point of the pipeline under test, and then measuring the loss of water from the line by the amount which must be added to maintain the original level. In this test, the test period (for taking measurements) shall not be less than three hours.
 - e. Procedure E - Shall consist of a pressure test using air only.
 - 1) All piping shall be tested at a pressure of at least two times the normal working pressure of the pipe, but in no case less than 50 psi in any of section of pipe being tested for a period of not less than 60 minutes.
 - 2. When no test method for inside process pressure piping is specified in the pipe schedule, the following procedure shall be used.
 - a. All newly installed pipe or any valved section thereof shall be subjected to a hydrostatic pressure 50 percent in excess of the working pressure at the point of testing, but in no case less than 50 psi in any section of the pipe being tested, for a period of 2 hours.
 - b. A leakage test shall be conducted concurrently with the pressure test. The section tested shall be driptight with no signs of leakage.
 - 3. Any leaks or defective pipe disclosed by any leakage and pressure tests shall be repaired or replaced and aforementioned tests repeated as often as necessary until conformance with the requirements.

4. All water for tests shall be furnished and disposed of by Contractor at his expense.
5. The source and quality of water which Contractor proposes to use in testing the lines shall be acceptable to Engineer.
6. All test water must be removed from the interior of all stainless steel pipe by draining, blowing, mopping, etc. Water must not be allowed to stand for long periods of time within stainless steel pipe.

3.04. PIPING STERILIZATION

- A. All pipe and fittings connected to and forming part of a potable water supply system shall be sterilized in accordance with the requirements of Sections 02661, Water Distribution Piping, and 02675, Disinfection of Water Distribution Systems.

(continued)

PROCESS PIPE SCHEDULE

Pipe No.	Identity	Predominant Size(s) (Inches)	Pipe Material	Schedule or Class	Joints	Test Procedure

END OF SECTION

SECTION 15081

HVAC PIPING INSULATION

PART 1 GENERAL

1.01. SUMMARY

- A. Section includes insulating the following HVAC piping systems:
 - 1. Refrigerant suction and hot-gas piping, indoors and outdoors.

1.02. ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail attachment and covering of heat tracing inside insulation.
 - 3. Detail insulation application at pipe expansion joints for each type of insulation.
 - 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 5. Detail removable insulation at piping specialties.
 - 6. Detail application of field-applied jackets.
 - 7. Detail application at linkages of control devices.

1.03. INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.04. QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 PRODUCTS

2.01. INSULATION MATERIALS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

2.02. ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- C. PVC Jacket Adhesive: Compatible with PVC jacket.

2.03. MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 - 4. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: 60 percent by volume and 66 percent by weight.
 - 4. Color: White.

2.04. SEALANTS

- A. Joint Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Permanently flexible, elastomeric sealant.

3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.

2.05. FIELD-APPLIED JACKETS

- A. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 1. Adhesive: As recommended by jacket material manufacturer.
 2. Color: White.
 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.06. TAPES

- A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 1. Width: 2 inches.
 2. Thickness: 6 mils.
 3. Adhesion: 64 ounces force/inch in width.
 4. Elongation: 500 percent.
 5. Tensile Strength: 18 lbf/inch in width.

2.07. SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- C. Wire: 0.062-inch soft-annealed, stainless steel.

PART 3 EXECUTION

3.01. PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.02. GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Manholes.
 - 5. Handholes.
 - 6. Cleanouts.

3.03. PENETRATIONS

- A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.04. GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- D. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- E. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

3.05. INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 1. Install pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.06. FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.
1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.07. FIELD QUALITY CONTROL

- A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded

valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.08. PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.09. INDOOR PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping: Flexible elastomeric, thick.

3.10. OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping: Insulation shall be the following:
 - 1. Flexible Elastomeric: 2 inches thick.

3.11. INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Exposed:
 - 1. None.
 - 2. PVC: 20 mils thick.

3.12. OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Exposed:
 - 1. PVC: 20 mils thick.

END OF SECTION

SECTION 15100

ABOVEGROUND PROCESS VALVES

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish, install, and test aboveground process valves and backflow preventers complete with operators and all other required accessories in accordance with the Contract Documents.

1.02. REFERENCES

- A. ANSI/AWWA C500 – Metal-Seated Gate Valves for Water Supply Service
- B. ANSI/AWWA C508 – Swing Check Valves for Waterworks Service 2 inches through 24 inches NPS
- C. ANSI/AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service
- D. ANSI/AWWA C510 – Double Check Valve Backflow Prevention Assembly
- E. ANSI/AWWA C511 – Reduced Pressure Principle Backflow Prevention Assembly
- F. ANSI/AWWA C515 – Reduced-Wall Resilient Seated Gate Valves for Water Supply Service
- G. ANSI/AWWA C517 – Resilient-Seated Cast-Iron Eccentric Plug Valves
- H. ANSI/AWWA C550 – Protective Interior Coatings for Valves and Hydrants
- I. ASTM A126 – Gray Iron Castings
- J. ASTM A48 – Gray Iron Castings for Valves, Flanges and Pipe Fittings

1.03. SUBMITTALS

- A. Provide in accordance with Sections 01300, Submittals; 01640; and as supplemented herein. Submittals shall include, but not be limited to, the following:
 - 1. Shop Drawings
 - a. Shop drawings shall indicate types of valves, hydrants, appurtenances and actuators proposed for the project including conformance to ANSI/AWWA codes and related details for field assembly, operations and maintenance. Contractor shall identify the service (i.e., digested sludge, polymer, etc.) that the proposed equipment is intended for on the shop drawing.

- b. For those valves with motors and actuators, submittals shall include dimensions and orientation of motors and actuators, size and quantity of conduit taps, complete wiring diagrams showing all provided options and inputs/outputs from the actuator assembly, input/output matrix of all available registers and corresponding system parameters that will be made available over the actuator's communication module.
 - c. Certification that all valve components that will come in contact with the liquid are fully compatible with the liquid inside of the valve and outside the valve.
 - d. Certification of UV inhibitors in plastic (CPVC, PVC, HDPE, etc.) valves that will be outdoors or submerged.
- 2. Shop Test Results - Submit test results, if shop testing is required.
 - 3. Certification of equipment compliance.
 - 4. Field Testing Results - Submit test results, if field testing is required.
 - 5. Operations and maintenance manuals.

PART 2 PRODUCTS

2.01. GENERAL

- A. The design working pressure shall be 200 psig for valves 12 inches NPS in diameter and smaller, and 150 psig for valves 16 inches NPS in diameter and larger.
- B. All valves shall be compatible with all the materials the valves shall be exposed to.
- C. All valves and deck hydrants shall have the manufacturer's name monogrammed or initialed by the manufacturer thereon and shall be identified by catalog numbers.
- D. Valve size, type of valve, joint type, class, lining, coatings shall be installed as listed herein or as shown on the Contract Drawings.
- E. Valves shall be of standard manufacturer and of highest quality, both as to material and workmanship, conforming to the latest edition of AWWA standards specified.
- F. All valves shall be provided with flanged or screwed ends as described herein or shown on the Contract Drawings.
- G. Valves 2 inches in nominal diameter and smaller shall be all brass or bronze, unless otherwise noted. Valves over 2 inches in nominal diameter shall be iron bodied, fully brass or bronze mounted, unless otherwise noted.
- H. All surface forming joints or bearing surfaces shall be machined to a perfect fit.
- I. All disc and seat rings shall be carefully and thoroughly secured in place with the iron castings machined where the rings are bare and the backs of the rings machined all over. After the rings have been fastened securely in place, the front shall be machined all over to a perfectly true and smooth bearing surface.

- J. All valves with non-rising stems shall have valve position indicators.
- K. Valves shall open counterclockwise (left) unless otherwise specified.
- L. Ferrous metal valves shall be painted in accordance with Section 09900, Painting.
- M. All new motorized actuators on motorized valves shall be of the same manufacturer.
- N. All valves installed on glass-lined process piping shall be glass lined. Refer to Section 15060, Aboveground Process Piping.

2.02. GATE VALVES

- A. Gate valves 2 inches and smaller shall be bronze gate valves with rising stem, double wedge disc, screwed bonnet, screwed ends, 125-lb. rating and shall be repackable under pressure in full open position.
- B. All gate valves 2 inches and smaller shall be Stockham Figure 107; Lunkenheimer Figure 2127; or equal.
- C. All gate valves for potable water and non-potable water service larger than 2 inches shall be resilient seated gate valves as specified herein, except where indicated otherwise on the Contract Drawings.
 - 1. All resilient seated gate valves shall provide a full pipe opening when fully opened.
 - 2. Resilient seated gate valves shall conform to AWWA Standard C509.
 - 3. All resilient seated gate valves shall be as manufactured by Kennedy Valve Manufacturing, Mueller, or equal.
- D. Rising stems shall be fabricated of stainless steel and shall operate with bronze stem nuts.
- E. Valves shall be manufactured by Kennedy Valve, Mueller, or equal.
- F. All interior gate valves shall be equipped with gear actuators and handwheel or chain and wheel operators unless otherwise specified.
 - 1. Handwheel or chain and wheel operators shall be replaceable with 2-inch operating nuts without replacing the valve stem or removing the bevel gears.
 - 2. Valves installed 6 feet above the floor or higher shall be provided with chainwheel operators.
 - 3. The diameter of the handwheels or chainwheels shall not exceed twice the diameter of the gear sector. Handwheels shall be ductile iron.
 - 4. Gears shall be made of bronze or be mounted on bronze bearings.
 - 5. Actuators shall be designed to produce the required torque with a maximum pull of 40 lbs. on the handwheel or chainwheel. The maximum input on operating nuts shall be 150 ft-lbs.

6. All actuator components shall be designed to withstand a pull of 200 ft-lbs. for handwheel/chainwheel and 300 ft-lbs. for operating nuts without any damage.
 7. Power actuators shall be designed and manufactured in accordance with all applicable requirements of ANSI/AWWA C450.
 8. Submerged valves shall be capable of withstanding external water pressure 50 percent greater than exposed to.
- G. Gate valves shall be designed to be leak-tight with full pressure on either face with no pressure on the opposite face.

2.03. PLUG VALVES

- A. Plug valves shall be non-lubricated, eccentric type and shall close drop-tight at the rated pressure of 150 psig.
- B. Port areas shall be of rectangular design and 100 percent of the standard pipe area.
- C. Valves shall be furnished with end connections shown on the Contract Drawings.
 1. Flanged valves shall be in accordance with the ANSI B16.1 Class 125/150 lb. standard.
 2. Mechanical joint ends shall be in accordance with the AWWA Standard C111.
- D. Valve bodies shall be constructed of cast iron in accordance with ASTM A126 Class B. All exposed nuts, bolt springs and washers shall be stainless steel.
- E. Valves shall be capable of providing drip-tight shut-off to the full rating with pressure on either side of the plug.
- F. Valves shall have welded-in-place nickel seats, except where rubber lining is required. Seats shall be raised 1/4-inch to prevent the plug from being in contact with the valve body when the plug is closed.
- G. The plug shall be Cast Iron ASTM A126 Class B or Ductile Iron ASTM 536 Grade 65-45-12 with chloroprene resilient facing.
 1. The plug shall be capable of withstanding the full pressure rating of the valve in either direction without the use of structural ribs that extend beyond the profile of the plug.
 2. No bolt-on sections to the plug shall be acceptable, it shall be one solid piece.
 3. Internal components shall be chemically resistant to the liquid for which it is servicing.
- H. Body and bonnet bearings shall be fabricated from sintered oil impregnated 316 stainless steel.

- I. The plug shaft seal shall utilize a bonnet and gland with a packing ring bonnet.
 - 1. Bonnet shall be the same material as the body.
 - 2. Gland shall be cast iron.
 - 3. Packing shall be NBR acrylonitrile-butadiene, V-type.
 - 4. For valves 4 inches and greater, the plug shaft seal shall be adjustable or completely replaceable without removing the operator, bonnet or plug from the valve.
 - 5. The plug shaft seal must be capable of being allowed to drain away from the valve without any liquid entering the operator.
- J. All valves 6 inches or larger shall be provided with gear actuators and handwheels. Inside valves smaller than 6 inches shall have lever operators.
 - 1. Valves installed 6 feet above the floor or higher shall be provided with chainwheel operators.
 - 2. The diameter of the handwheels or chainwheels shall not exceed twice the diameter of the gear sector. Handwheels shall be ductile iron.
 - 3. Gears shall be made of bronze or be mounted on bronze bearings.
 - 4. Actuators shall be designed to produce the required torque with a maximum pull of 40 lbs. on the handwheel or chainwheel. The maximum input on operating nuts shall be 150 ft-lbs.
 - 5. All actuator components shall be designed to withstand a pull of 200 ft-lbs. for handwheel/chainwheel and 300 ft-lbs. for operating nuts without any damage.
 - 6. Power actuators shall be designed and manufactured in accordance with all applicable requirements of ANSI/AWWA C450.
 - 7. Submerged valves shall be capable of withstanding external water pressure 50 percent greater than exposed to.
 - 8. All gearing shall be enclosed in a cast iron housing.
- K. Unless otherwise specified, valves shall be installed so that when closed, the plug is at the upstream end of the valve.
- L. In horizontal piping with the plug shaft installed horizontally, the plug shall be in the upper part of the valve body when open.
- M. Plug valves on digester gas piping shall have 316 stainless steel body/plug, with stainless steel bearings.
- N. Plug valves shall be as manufactured by DeZURIK, or equal.

2.04. CHECK VALVES

- A. The valves shall be designed, manufactured, tested and certified to American Water Works Association Standard ANSI/AWWA C508.
- B. The valves shall have flanges with drilling to 125/150 per ASME B16.1.
- C. The valve body shall be full flow equal to nominal pipe diameter at all points through the valve. The 4-inch (100mm) valve shall be capable of passing a 3-inch (75mm) solid. The seating surface shall be on a 45-degree angle to minimize disc travel. A threaded port with pipe plug shall be provided on the bottom of the valve to allow for field installation of a backflow actuator or oil cushion device without special tools or removing the valve from the line.
- D. The body seat shall be 316 stainless steel per ASTM A276 with an O-ring seal, locked into place with stainless screws.
- E. The top access port shall be full size, allowing removal of the disc without removing the valve from the line. The access cover shall be domed in shape to provide flushing action over the disc for operating in lines containing high solids content. A threaded port with pipe plug shall be provided in the access cover to allow for field installation of a mechanical, disc position indicator.
- F. The disc shall be of one-piece construction, precision molded with an integral O-ring type sealing surface and reinforced with alloy steel. Non-slam closing characteristics shall be provided through a short 35-degree disc stroke and a disc accelerator to provide a cracking pressure of 0.3 psig.
- G. The disc and disc arm shall be ASTM A536 ductile iron.
- H. The valve disc shall be cycle tested 1,000,000 times in accordance with ANSI/AWWA C508 and show no signs of wear, cracking, or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures.
- I. The valve body shall be constructed of ASTM A536 Grade 65-45-12 ductile iron.
- J. All check valves shall be manufactured by DeZURIK, or equal.

2.05. SURGE RELIEF ANGLE VALVES

- A. Surge relief angle valves shall be installed where shown on the Contract Drawings.
- B. Surge Relief Angle Valve shall be a 90-degree elbow design conforming to the center-to-face dimension for long-radius elbows per ASME B16.1 and ASME B16.42. Valve shall be a compact design to fit in tight installation spaces.
- C. A single adjustment screw shall be provided for field adjustment of relief pressure setting. Springs shall be sized to optimally match customer-specified relief pressure setting to minimize pressure rise above the set-point to fully open valve.
- D. Valves shall be a minimum of 6 inches in size.

- E. The body and cover shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. Flanges shall be flat faced and conform to ASME B16.42 Class 150. Body seat shall be aluminum bronze C965200 or 316 stainless steel; valve disc shall have a replaceable seat ring of Acrylonitrile-Butadiene (NBR); Terpolymer of Ethylene, Propylene and A Diene (EPDM) or Fluoro Rubber (FKM) for tight shutoff.
- F. Manufacturer - APCO model SRA-3000A, DeZURIK or equal.
- G. Valves shall contain backflushing attachments.

2.06. COMBINATION AIR VALVES

- A. Combination air valves shall be installed where shown on the Contract Drawings.
- B. Combination air valves in sizes 1-6" shall be single body design and shall provide both Air Release and Air/Vacuum valve functions.
- C. Valve shall have an upper body compression chamber to limit fluid level and solids interference. Lower body shall be funnel shaped to reduce solids buildup and allow for self-cleaning and maximum outflow.
- D. The guided float shaft shall provide smooth automatic Air Release and Air/Vacuum operation. No linkages shall be used.
- E. Flow deflector/splash reduction ring shall be used to restrict solids entry and minimize flow effect and splash that can cause float instability.
- F. Body, float, float shaft and hardware shall all be 316 stainless steel. Piston stem and seat shall be 17-4 PH stainless steel. Elastomer seals shall be Acrylonitrile-butadiene (NBR). Piston stem guides shall be Acetal Polyoxymethylene (POM).
- G. Manufacturer – DeZURIK or equal.

2.07. WALL HYDRANTS

- A. Wall hydrants shall be non-freeze, exposed head type with 1-inch hose connections and 1-inch quick disconnect male hose adapters.
- B. Hydrants shall have bronze casing, all bronze interior parts, a non-turning operating rod with free-floating compression closure valve, replaceable bronze seat and seat washer, 1-inch IP inlet and hand wheel operator.
- C. Wall hydrants shall be Zurn Model Z-1315, or equal.

2.08. PRESSURE GAUGES

- A. Liquid Service
 - 1. Pressure gauges shall be of the bourdon tube type with 4-1/2-inch diameter and diaphragm seals.

2. Case ring shall be black epoxy coated aluminum, bourdon tube shall be phosphor bronze with a brass tip and window shall be glass unless otherwise specified.
3. Pressure gauges shall be stem mounted where shown on the Contract Drawings.
4. Pressure gauges shall be calibrated to read zero at atmospheric pressure.
5. Suction (vacuum) gauges shall be of the compound type to indicate both pressure and vacuum; they shall be calibrated to read 25 feet of water above and below zero.
6. Discharge (pressure) gauges shall be calibrated to read from 0 feet to a minimum of 5 feet of water pressure above the maximum operating pressure for the associated process pipe.
7. All pressure gauges shall have continuous duty, clamped Teflon diaphragm seals. Pressure gauges and diaphragm seals shall be by same manufacturer and shall be shipped as complete units, factory filled with silicone fluid.
 - a. Each diaphragm seal shall have Type 316 stainless steel upper and lower housings. The lower housing shall be a threaded connection.
 - b. Each pressure gauge and diaphragm seal unit shall be connected with the necessary brass pipe fittings and a brass stopcock.
8. All pressure gauges furnished under this section shall be supplied by the same manufacturer. Pressure gauge manufacturer shall be Ashcroft, or equal.

2.09. BACKFLOW PREVENTERS

- A. Reduced pressure zone backflow preventers shall be supplied where shown on the Drawings.
- B. The backflow preventers shall consist of two spring-loaded check valves and a spring-loaded, diaphragm-actuated, differential pressure relief valve located in the zone between the check valves.
- C. The unit shall include properly located test cocks and operation shall be completely automatic. The total headloss shall not exceed 10 psi at AWWA rated flow.
- D. All parts shall be manufactured from corrosion-resistant materials.
- E. A continuous discharge from the relief valve opening shall provide a visual inspection of need of repair.
- F. Manufacturers - Reduced pressure zone backflow preventers shall be listed on approved list of University of California Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR). Manufacturer shall provide documentation of FCCCHR listing.
- G. Install in accordance with the Plumbing Code of New York State and the New York State Department of Health Cross-Connection Control Program.

2.10. TAPPING SLEEVES AND VALVES

- A. Tapping sleeves and valves shall be provided where shown on the Contract Drawings.
- B. Tapping sleeves shall be compatible with the pipe encountered so that a watertight connection will be made.
- C. The sleeve shall be adequate to provide reinforcement of the pipe being tapped and protect this pipe against all strains resulting from either tapping the pipe or connecting to the pipe.
- D. Tapping valves used shall conform to the requirements for gate valves specified herein.
- E. Tapping sleeves and tapping valves for this project shall be Models H-615 and T-2360, respectively, as manufactured by Mueller Company or equal.
- F. The tapping contractor shall have a minimum of five years' experience in performing taps.
- G. After the sleeve has been installed, but prior to making the tap, the sleeve shall be subjected to a hydrostatic test equal to the maximum line pressure. There shall be no observed leakage from the sleeve.

2.11. HANDWHEEL OPERATORS

- A. Valves specified with handwheel operators shall have the proper size handwheel to provide an effortless operation.
- B. Handwheels shall be made of bronze or cast iron and shall be properly secured to the valve stem to prevent displacement during use.

2.12. WRENCH OPERATORS

- A. Wrench for wrench-operated valves located above ground shall be of bronze or cast iron, and shall be of suitable size and length to facilitate an effortless operation. One wrench shall be provided for each valve on the project requiring wrench operation.

2.13. CHAIN OPERATORS

- A. All valves located with center of shaft 6 feet or higher from the operating floor shall be equipped with chain operators.
- B. The chain operators shall have a straight or a beveled gear reducer-type operator depending on the type recommended by the manufacturer.
- C. The length of the operating chain shall extend to 4 feet 0 inches above the operating floor.
- D. Chain in wet or corrosive areas shall be stainless steel.

2.14. EXTENDED OPERATORS

- A. All submerged valves, valves located below walkways and as otherwise shown on the Drawings shall be provided with extended operators.

- B. Extended operators shall be cold rolled steel supported by bronze bushed, cast iron guide brackets at intervals not to exceed 10 feet.
- C. Extended operators shall be provided with position indicators and shall be of sufficient length to allow operation of valve from approximately 48 inches above the surface of the walkway or as shown in the Contract Drawings.
- D. Anchor bolts for guide brackets shall be stainless steel.
- E. Right angle extended operators of the same material shall be furnished where shown on the Contract Drawings. Each right angle extended operator shall be provided with a minimum of two bearing blocks.

2.15. VALVE TAGS

- A. Provide valve tags for all valves. Tag/identification shall be coordinated with Engineer.
- B. Tags shall be made from a plastic laminate of heavy plastic with a brass eyelet in the corner and shall be engraved or printed with the valve number and fluid in the pipe.
- C. Tags shall be fastened to each valve with a brass chain.
- D. Tags to be made by Seton Name Plate Company, New Haven, CT; W.H. Brady Company; or equal.

2.16. FABRICATION REQUIREMENTS

- A. Shop coat per manufacturer's standard finish system and color.
- B. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- C. Welds shall be continuous unless noted otherwise.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- B. No modifications to equipment shall be made without the written consent of the manufacturer and approval of Engineer.
- C. Field verify all dimensions and elevations. Notify Engineer of specific differences.
- D. Verify that structures are complete and ready to receive work.

- E. All valves, deck hydrants and appurtenances shall be carefully inspected in the field before installation.
 - 1. Cracked, broken, warped, out-of-round, damaged joints, including damaged linings or coatings, or otherwise defective valves, hydrants and stops, as determined by the Engineer, shall be culled out and not installed.
 - 2. Rejected material shall be clearly tagged in such manner as not to deface or damage it, and the material shall then be removed from the job site by the Contractor at his own expense.
- F. For tapping sleeve and valve connections, the Contractor, prior to making any connections, shall verify the material and outside diameter of existing water main.
- G. Contractor shall have on the job site all the proper tools, gauges, pipe cutters, lubricants, etc., to properly install valves, deck hydrants, etc.
- H. Contractor shall verify all valve positions and locations before installation.
- I. Valves, backflow preventers and appurtenances shall be installed at the elevations and locations shown on the Contract Drawings.
- J. The Contractor shall furnish slings, straps, and/or approved devices to provide satisfactory support of the valves or hydrants when lifted. Transportation from storage areas to the work area shall be restricted to operations which can cause no damage to the coating or lining or castings
- K. The valves or deck hydrants shall not be dropped from trucks onto the ground or into the trench.
- L. All valves shall be installed in accordance with the specifications for the pipe to which they are to be connected and as previously described for individual types of valves.
- M. Joints of valves shall be made up in accordance with the Contract Drawings and/or as described under the appropriate pipe joint descriptions found in other sections of these specifications.
- N. The valves shall be so located that they are accessible for operating purposes and shall bear no stresses due to loads from the adjacent pipe.
- O. All valves shall be inspected before installation, and they shall be cleaned and well lubricated before being installed in the line.
- P. Hydrants shall be set at locations specified on the Contract Drawings. Hydrants shall be set so that the barrel is truly vertical and shall be backfilled so that the barrel will remain vertical. They shall be placed with 3 cubic feet of crushed stone pocket to provide drainage for the hydrant.
- Q. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for installation and testing.

- R. Surface preparation and field painting shall be in accordance with Division 9 specifications.
- S. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- T. Anchor rods (bolts) shall be Type 316 SS HILTI-style adhesive anchors.
- U. Backpaint aluminum in contact with painted or galvanized steel or concrete with 5 mils of Tnemec Series N69-Gray, Hi-Build Epoxoline or DuPont 25P Epoxy.
- V. Isolate dissimilar metals by backpainting or with dielectric using stainless steel fasteners

3.02. TESTING AND STARTUP

- A. Testing and startup shall be performed in accordance with Section 01660, Testing and Startup, and as specified herein unless otherwise noted.
- B. All testing shall be done in the presence of the Engineer and the equipment manufacturer or their approved representative.
- C. Valves and appurtenances installed in piping systems shall be pressure tested under the same conditions required for the adjacent piping. Refer to Section 15060, Aboveground Process Piping, for pipe testing requirements.

END OF SECTION

SECTION 15140

SUPPORTS AND ANCHORS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install supports and anchors complete with all required accessories to provide complete support systems that can adequately support loads under all operating conditions in accordance with the Contract Documents.
- B. The locations of all required supports, anchors, and accessories are not shown on the Drawings.
- C. Where supports, anchors, and accessories are shown on the Drawings, they shall be considered to be the minimum allowable requirements. Provide additional supports, anchors, and accessories as required for complete support systems.
- D. The type and location of supports for exterior above-grade process piping where supports are not shown or requiring additional supports shall be based on the results of pipe support design as verified and substantiated by pipe stress and thermal analysis prepared, signed, and sealed by a Professional Engineer.

1.02. SECTION INCLUDES

- A. Piping and equipment hangers and supports.
- B. Equipment bases and supports.
- C. Inserts.
- D. Schedules.

1.03. REFERENCES

- A. ASME B31.1, Power Piping, latest edition
- B. ASME B31.3, Process Piping, latest edition
- C. ASME B31.9, Building Services Piping, latest edition
- D. ASTM E84 - 13a, Standard Test Method for Surface Burning Characteristics of Building Materials
- E. ASTM F708, Design and Installation of Rigid Pipe Hangers
- F. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
- G. MSS SP-69 - Pipe Hangers and Supports - Selection and Application

- H. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices
- I. NFPA 13: Standard for the Installation of Sprinkler Systems, latest edition
- J. NFPA 14: Standard for the Installation of Standpipe and Hose Systems, latest edition
- K. Seismic Considerations - Refer to State Building Codes

1.04. SUBMITTALS

- A. Product Data – Provide manufacturers' catalog data including materials and load capacity.
- B. Design Data - Indicate load carrying capacity of trapeze, unistrut, multiple pipe, and riser support hangers.
- C. Manufacturer's Installation Instructions - Indicate special procedures and assembly of components.
- D. Certification by the Professional Engineer registered in the State of New York stating that the pipe support systems comply with the requirements of specifications and are adequate to support the pipe within allowable stress limits under all operating conditions. The type and location of pipe supports, hangers, expansion couplings, and expansion joints shall be selected and supports shown on Drawings shall be supplemented based on pipe stress analysis. Include support layout and design calculations and indicate size and characteristics of components and fabrication details.
- E. Thermal stress (expansion:contraction) analysis shall be performed for exposed and buried process air piping and shall be signed and sealed by a Professional Engineer registered in the State of New York.
- F. Design calculations shall be signed and sealed by a Professional Engineer licensed in the State of New York.
- G. Seismic Restraints
 - 1. Design calculations signed and sealed by a Professional Engineer licensed in the State of New York.
 - 2. Include dead loads, static seismic loads, capacity of materials, and other information deemed necessary by the designer.
 - 3. Clearly identify design criteria used including, but not be limited to, the following:
 - a. Peak velocity-rated acceleration coefficient.
 - b. Seismic hazard exposure group.
 - c. Seismic performance category.
 - d. Seismic coefficient.
 - e. Performance criteria factor.

- f. Component amplification factor.
- 4. Identify all exceptions.
- 5. If seismic restraints are not required, a Professional Engineer registered in the State of New York shall provide a letter on the Professional Engineer's letterhead with justification. Letter shall contain a signed and sealed Professional Engineer's stamp from the State of New York.

1.05. PIPE SUPPORT DESIGN ENGINEER QUALIFICATIONS

- A. Engineering Responsibility - Design and preparation of shop drawings and calculations for each multiple pipe support, trapeze, and seismic restraint by a qualified Professional Engineer.
- B. Professional Engineer Qualifications - A Professional Engineer who is legally qualified to practice in jurisdiction where the project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this project in material, design, and extent.
- C. The support system engineer shall have at least five years of experience in the analysis and design of similar systems, including the use of commercial and custom pipe supports and in the use of commercial pipe stress software programs. Provide a detailed resume, including references from projects within the past five years. Acceptance of the proposed support systems engineer shall be subject to the approval of Engineer.

1.06. REGULATORY REQUIREMENTS

- A. Conform to National Standard Plumbing Code – Chapter 8 for support of plumbing piping.
- B. Supports for Sprinkler Piping - In conformance with NFPA 13.
- C. Supports for Standpipes - In conformance with NFPA 14.

PART 2 PRODUCTS

2.01. GENERAL

- A. All hangers and supports shall be manufactured or fabricated from materials suitable for the particular area in which they are installed.
 - 1. The Contractor shall install hanger supports that are similar in material construction regardless of piping or conduit application within a given area.
 - 2. Pipe hangers and supports for process pipe, conduit, heating and ventilating piping and plumbing piping shall be constructed of similar materials, (e.g., all hangers and supports located in an interior wet location shall be manufactured from Type 316 stainless steel or polyvinyl chloride (PVC)-coated galvanized steel).

3. Where applicable, fasteners, brackets and supports shall be fabricated in accordance with Section 05500, Miscellaneous Fabrications, and as specified herein.

2.02. SEISMIC RESTRAINTS

- A. Provide seismic restraint for all piping, ductwork, equipment, and systems in accordance with all applicable Building Codes.

2.03. PIPE THERMAL STRESS ANALYSIS DESIGN CONDITIONS

- A. Air piping support systems shall be designed based on the following:
 1. Installation Temperature
 - a. Indoor and Outdoor Exposed - 60 degrees F.
 - b. Submerged - 80 degrees F.
 2. Minimum Ambient Temperature - 0 degrees F.
 3. Maximum Ambient Temperature - 100 degrees F.
 4. Blower Discharge Temperature - 300 degrees F.

2.04. MATERIALS

- A. Pipe support and hanger material in contact with pipes shall be compatible with the piping material so that neither shall have a deteriorating action on the other.
- B. All hangers and supports shall be manufactured or fabricated from materials suitable for the particular area in which they are installed. Reference the Contract Documents for area classifications and the Hanger and Support Application Schedule herein.
- C. Where applicable, fasteners, brackets and supports shall be fabricated in accordance with Section 05500, Miscellaneous Fabrications, and as specified herein.
- D. Anchors for supports shall be fabricated in accordance with Section 05505, Concrete and Masonry Anchors.
- E. Stainless Steel - For the purpose of this section, all stainless steel shall be Type 316.
- F. PVC-Coated Materials - PVC-coated hangers and supports shall be installed where applicable for chemical and corrosion-resistant applications as required in the specified areas, or as specifically called out in other sections of these specifications. PVC coating process shall be as follows:
 1. Piping systems scheduled as PVC-coated shall have stainless steel support rods, stainless steel mounting hardware, stainless steel fasteners, and stainless steel concrete inserts. All non-stainless steel parts of the hangers and supports shall be PVC coated.
 2. Hanger or support shall be hot dipped galvanized including the threads.

3. The zinc surface shall be treated with chromic acid prior to coating to enhance the bond between metal and plastic.
 4. All surfaces shall be coated with an epoxy acrylic primer of approximately 0.0005-inch thickness.
 5. The coating shall be applied by the liquid plastisol method.
 6. The plastisol shall be compounded of pure materials and shall be free of any fillers or secondary plasticizers.
 7. A PVC coating shall be bonded to the galvanized outer surface of the product. The bond between the PVC coating and the product surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040-inch (40 mils).
 8. Coating system shall be OCAL-40 as provided by Occidental Coating Company, Van Nuys, CA; Plasti-Bond Red as provided by Robroy Industries, Verona, PA; or equal.
- G. Steel and steel alloy hangers and supports shall conform to ASME B31.1, ASME B31.3, ANSI B31.10, and MSS Standard Practice SP-58.
- H. Fiberglass Reinforced Plastic (FRP) Hangers and Supports
1. FRP Systems - Use StrutTech, Aickinstrut, or equal.
 2. All vinylester (Series VF) and polyester fiberglass (Series PF) shall be Class 1 ASTM E84, and Polyurethane V-O shall be UL94V PVC (Capping strip) 5V and V-O UL94.
 3. All fiberglass channels shall be vinylester or polyester resin.
 4. All pipe clamps shall be manufactured of thermoplastic polyurethane, polyester or thermoset vinylester fiberglass, compatible with pipe size to be supported.
 5. All fasteners including channel nuts, bolts, nuts, washers, couplers shall be glass filled polyurethane resin.
 6. All thread rods shall be vinylester fiberglass.
 7. Verify that the materials of the FRP support system meet the required chemical resistance for the chemical being transported.

2.05. MANUFACTURERS

- A. Anvil International
- B. Carpenter & Patterson
- C. Unistrut Corporation
- D. Cooper Industries - B-Line Systems

- E. Globe Division of United States Gypsum
- F. Robroy Industries
- G. OCAL
- H. Or equal

2.06. HANGER AND SUPPORT SCHEDULES

- A. The following schedules are provided to identify the type of hangers and supports acceptable under this Contract. Provide the type of hangers and supports in these schedules, however, the acceptable materials of construction shall be provided as identified in the “Application Schedule” for the various systems and the intended location of the hanger or support. Several pipe supports are not specifically labeled on the Drawings for clarity.

PIPE HANGER AND SUPPORT SCHEDULE – INSIDE PROCESS PIPING

Type	Pipe System	Designation
A	All materials, non-insulated	Clevis hanger
A	All materials, insulated	Clevis hanger with protection shields
B	Ductile iron, steel	Pipe stanchion saddle, pipe support and floor plate with stainless steel yoke.
C	Ductile iron, PVC	Split pipe clamp with base flange
D	PVC and steel	PVC-coated clamp
E	Ductile iron, steel	Pipe support in trench
F	Ductile iron, steel	Concrete base fitting support
G	Ductile iron, steel	Concrete pipe support
H	Ductile iron, steel	Welded steel bracket
I	PVC, hose	Pipe channel support
J	Ductile iron, steel PVC	Channel framing
K	Ductile iron, steel	Steel pipe floor support
L	Ductile iron, steel, PVC	Concrete pipe support in trench
M	Ductile iron, steel, PVC	Steel angle pipe support

- B. Components of the alphabetical pipe support “Types” are further defined below. The numerical “Type” listed is based on nomenclature from MSS SP-58. Support materials from the manufacturers shall correspond to the MSS SP-58 type.
- C. Refer to the support details on the Drawings for further requirements.
- D. Process Piping
 - 1. U-Bolts - Type 24.
 - 2. Clevis Hangers - Type 1. Use Type 39 or 40 protection shields for insulated pipe.
 - 3. Yoke Type Pipe Clamp - Type 2. Use for pipe with up to 4 inch insulation.

4. Pipe Clamps - Type 3, 4 and 12. Do not use for insulated pipe.
5. Riser Clamps - Type 8 and 42. Do not use for insulated pipe.
6. Straps - Type 26.
7. Pipe Rollers and Roller Supports - Type 41 and 43. Use Type 39 or 40 protection shields for insulated pipe.
8. Trapezes - Type 59. Use Type 39 or 40 protective shields for insulated pipe. To be used only if all of the pipes to be supported are at the same bottom elevation.
9. Roller Hanger - Type 44, Use Type 39 or 40 protective shields for insulated pipe.
10. Stanchions
 - a. Pipe Saddle - Type 37. Use Type 39 or 40 protective shields for insulated pipe.
 - b. Adjustable Pipe Saddle with U-bolt, Type 38. Use Type 39 or 40 protective shields for insulated pipe.
11. Wall Brackets
 - a. For 4-inch diameter and larger piping, use only where indicated on Drawings.
 - b. Light duty, Type 31.
 - c. Medium duty, Type 32.
 - d. Heavy duty, Type 33.
12. Structural Attachments
 - a. Welded Beam Attachment - Type 22.
 - b. Plate Lug - Type 57.
 - c. Concrete Inserts and Attachments - Anvil Figure 47, 49, and 52, or equal.
13. Strut Support Systems - Use Unistrut Corporation, B-Line Systems, Globe Division of United States Gypsum, or equal.
 - a. System shall permit rigid metal construction without welding or drilling.
 - b. All members shall be fully adjustable, demountable and reusable.
 - c. One manufacturer shall furnish system complete with all nuts, bolts, couplers, channels and all other required fittings and mechanical accessories.
 - d. Channels and accessories shall be galvanized steel with 20 mil PVC coating, all of the same color.

- e. All mounting hardware, fasteners and concrete inserts shall be Type 316 stainless steel.
 - f. Pipe clamps shall be PVC-coated galvanized straps with stainless steel rods, nuts, and flat washers.
 - g. Verify that the load carrying capacity of the strut system is adequate for weight of pipes and contents and span utilized.
- E. Hanger rods shall be machine threaded and based on root diameter. When hanger rods are over 18 inches in length, lateral bracing shall be provided every fourth hanger. The minimum rod diameter shall be as follows:

Pipe Diameter (Inches)	Minimum Rod Size (Inches)
2 and smaller	3/8
2-1/2 to 3-1/2	1/2
4 and 5	5/8
6 and 8	3/4
10 and 12	7/8
14 to 18	1
20 and 24	1-1/4

PART 3 EXECUTION

3.01. GENERAL

- A. All piping to be supported from floors, concrete slabs, ceilings or walls shall have supports and parts required for the installation of the piping systems which conform to the applicable requirements of ASME B31.1 and ASME B31.3 to the requirements of Chapter 1, Section 6 of the ANSI Code for Pressure Piping (B31.1), except as modified and supplemented by the requirements set forth in these Specifications.
- B. All piping shall be rigidly supported from the building structure by approved hangers, inserts, or supports, with adequate provisions for expansion and contraction. No piping shall be supported from other piping or from metal stairs, ladders, and walkways unless specifically directed by Engineer.
- C. In addition to the hangers and supports spaced as specified above, Contractor shall furnish and install additional hangers and supports at all valves, fittings, and pipe line equipment. Holding devices for valves and other pipe line appurtenances shall be designed and constructed to hold each unit securely.
- D. All vertical pipes shall be supported at each floor and/or at intervals of not more than 10 feet by approved pipe collars, clamps, brackets, or wall rests, and at all points necessary to ensure rigid construction.
- E. Spacing of supports for PVC pipe and provision for expansion shall be determined by operating temperature, size of pipe, and other conditions. It shall be such as to prevent subsequent visible sagging of the pipe between supports due to plastic deformation.

- F. In general, adjustable saddle supports shall be used when the height of the centerline of the pipe is 0 to 6 feet above the floor and hangers or brackets shall be used when the height of the centerline of pipe is greater than 6 feet.
- G. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories. Non-adhesive-type anchors are only allowed in applications in which the support is suspended from the ceiling and shall comply with Section 05505, Concrete and Masonry Anchors. All other applications shall be provided with adhesive anchors.
- I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- J. Load Distribution - Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. The hangers and supports shall be designed to resist or to allow controlled movement caused by operation of equipment.
- L. Pipe Slopes - Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

3.02. SUPPORT INTERVALS

- A. At a minimum, additional supports or anchors will be required at:
 - 1. All bends on pump discharge line to prevent vertical or horizontal movement resulting from pressure thrusts.
 - 2. Each side of all couplings in the horizontal plane to eliminate vertical force on couplings.
 - 3. All branch connections to eliminate vertical and horizontal movement.
 - 4. Both side of expansion joints to prevent horizontal movement.
 - 5. All pipe joints subject to torque along centerline of pipe. Piping shall be supported so that pumps and other equipment may be removed without providing additional pipe support.
 - 6. Where depicted on the Drawings, pipe supports shall be of the type indicated.

- B. Flanged Ductile Iron Pipe - Supports and hangers for pipe 1-1/4 inches and larger, support spacing shall be 10 feet maximum.
 - 1. Additional supports and hangers will be required for grooved end ductile iron pipe and fittings at the Contractor's expense.
- C. Plastic Pipe - Supports and hangers and/or braces for plastic piping shall be used at all bends and support spacing shall be 4 feet maximum horizontally and vertically, except non-metallic electrical conduit support spacing shall be 3 feet maximum.
 - 1. Supports and hangers for plastic piping shall include saddles and bands to distribute load and thus avoid localized deformation of the pipe.
 - 2. All necessary inserts or appurtenances shall be furnished and installed in the concrete or structures for adequately securing these supports to the structure.
- D. Steel and Wrought Iron Pipe - Supports and hangers for steel and wrought iron pipe less than 1-1/4 inches, support spacing shall be 8 feet maximum; 1-1/4 inches and larger, support spacing shall be 10 feet maximum.
- E. Copper Pipe - Copper pipe 1/2-inch to 1-inch, support spacing shall be 6 feet maximum; 1-1/4-inch and over, support spacing shall be 10 feet maximum.
- F. Cast Iron Pipe - Cast iron soil pipe shall be supported at each length, close to bell.

3.03. INSERTS

- A. Provide inserts for suspending hangers from concrete slabs and sides of concrete beams.

3.04. HANGER AND SUPPORT APPLICATION SCHEDULE

- A. The materials of construction for all hangers and supports, applicable to inside process piping, fire protection, plumbing and HVAC systems, used on the project, shall be in accordance with the Hanger and Support Application Schedule. Refer to the Drawings for the classification for each room.

(continued)

Area	Acceptable Materials
EXTERIOR:	
<ul style="list-style-type: none"> Exposed to outdoor conditions Inside tanks Submerged locations unless otherwise specified 	Type 316 stainless steel
INTERIOR:	
Corrosive or Wet/Corrosive Areas (either Unclassified or Hazardous)	
<ul style="list-style-type: none"> Interior sodium hypochlorite storage and feed areas 	FRP
Unclassified, Unclassified/Wet Areas	
<ul style="list-style-type: none"> Pump rooms Piping galleries Below-grade vaults, manholes, and handholes Polymer storage and feed areas 	Type 316 stainless steel
Hazardous, Hazardous/Wet Areas	
<ul style="list-style-type: none"> NEC Class I, Division 1 or 2, Groups C and D 	Type 316 stainless steel

END OF SECTION

SECTION 15187

REFRIGERANT PIPING

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Refrigerant pipes and fittings.
2. Refrigerant piping valves and specialties.
3. Refrigerants.

1.02. ACTION SUBMITTALS

A. Product Data: For each type of valve, refrigerant piping, and refrigerant piping specialty.

B. Shop Drawings:

1. Show piping size and piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.
2. Show interface and spatial relationships between piping and equipment.
3. Shop Drawing Scale: 1/4 inch equals 1 foot.

1.03. INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.04. CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.05. QUALITY ASSURANCE

- A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

PART 2 PRODUCTS

2.01. PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air-Conditioning Applications: 300 psig.
 - 2. Suction Lines for Heat-Pump Applications: 535 psig.
 - 3. Hot-Gas and Liquid Lines: 535 psig.

2.02. COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8/A5.8M.
- F. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
 - 4. Working Pressure Rating: Factory test at minimum 500 psig.
 - 5. Maximum Operating Temperature: 250 deg F.

2.03. REFRIGERANTS

- A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. DuPont Fluorochemicals Div.
 - b. Genetron Refrigerants; Honeywell International Inc.
 - c. Mexichem Fluor Inc.

PART 3 EXECUTION

3.01. PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.02. PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping adjacent to machines to allow service and maintenance.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- J. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection.
- K. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- L. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.

- M. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- N. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- O. Identify refrigerant piping and valves according to Section 15075 "Identification for HVAC Piping and Equipment."

3.03. PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

3.04. HANGERS AND SUPPORTS

- A. Comply with requirements for pipe hangers and supports specified in Section 15060 "Hangers and Supports for HVAC Piping and Equipment."
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
 - 2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
 - 5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for copper tubing with the following maximum spacing and minimum rod diameters:
 - 1. NPS 1/2: Maximum span, 60 inches; minimum rod, 1/4 inch.
 - 2. NPS 5/8: Maximum span, 60 inches; minimum rod, 1/4 inch.

3. NPS 1: Maximum span, 72 inches; minimum rod, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod, 1/2 inch.

D. Support multi-floor vertical runs at least at each floor.

3.05. FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

B. Prepare test and inspection reports.

3.06. SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.07. ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Open shutoff valves in condenser water circuit.
 - 2. Verify that compressor oil level is correct.
 - 3. Open compressor suction and discharge valves.
 - 4. Open refrigerant valves except bypass valves that are used for other purposes.
 - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

SECTION 15400

BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01. WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these Contract Documents.

1.02. LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the local jurisdiction.
- B. Plumbing work shall be performed by, or under, the direct supervision of a licensed master plumber if so required by the local jurisdiction.
- C. The Contractor shall be responsible for reviewing the local jurisdiction requirements prior to bidding.

1.03. PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges.

1.04. CODE COMPLIANCE

- A. Provide work in compliance with the following:
 - 1. The Building Code of New York State including The Fire Code; Property Maintenance Code; Plumbing Code, Mechanical Code and Fuel Gas Code; and The Energy Code of New York.
 - 2. New York State Department of Labor Rules and Regulations.
 - 3. Occupational Safety and Health Administration (OSHA).
 - 4. National Fuel Gas Code, NFPA 54.
 - 5. National Electrical Code, NFPA 70.
 - 6. Local Codes and Ordinances.
 - 7. Life Safety Codes, NFPA 101 (2015).
 - 8. New York Board of Fire Underwriters.

1.05. GLOSSARY

- A. ACI - American Concrete Institute
- B. AGA - American Gas Association
- C. AGCA - Associated General Contractors of America, Inc.
- D. AIA - American Institute of Architects
- E. AISC - American Institute of Steel Construction
- F. AFBMA - Anti-Friction Bearing Manufacturer's Association
- G. AMCA - Air Moving and Conditioning Association, Inc.
- H. ANSI - American National Standards Institute
- I. ARI - Air Conditioning and Refrigeration Institute
- J. ASHRAE - American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc.
- K. ASME - American Society of Mechanical Engineers
- L. ASPE - American Society of Plumbing Engineers
- M. ASTM - American Society for Testing Materials
- N. FM - Factory Mutual Insurance Company
- O. IBR - Institute of Boiler & Radiation Manufacturers
- P. IEEE - Institute of Electrical and Electronics Engineers
- Q. IRI - Industrial Risk Insurers
- R. NYBFU - New York Board of Fire Underwriters
- S. NEC - National Electrical Code
- T. NEMA - National Electrical Manufacturer's Association
- U. NESC - National Electrical Safety Code
- V. NFPA - National Fire Protection Association
- W. NYSDEC - New York State Department of Environmental Conservation
- X. SBI - Steel Boiler Institute
- Y. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
- Z. UFPO - Underground Facilities Protection Organization
- AA. UL - Underwriter's Laboratories, Inc.
- AB. OSHA - Occupational Safety and Health Administration
- AC. NYS/UFPBC - New York State Uniform Fire Prevention and Building Code

1.06. DEFINITIONS

- A. Acceptance - Owner acceptance of the project from Contractor upon certification by Owner's Representative.
- B. Approval/Approved - Written permission to use a material or system.
- C. As Called For - Materials, equipment including the execution specified/shown in the contract documents.
- D. Code Requirements - Minimum requirements.
- E. Concealed - Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
- F. Design Equipment - Refer to Article 1.09.
- G. Design Make - Refer to Article 1.09.
- H. Exposed - Work not identified as concealed.
- I. Equal or Equivalent - Equally acceptable as determined by Owner's Representative.
- J. Furnish - Supply and deliver to installed location.
- K. Furnished by Others - Receive delivery at job site or where called for and install.
- L. Inspection - Visual observations by Owner's site Representative.
- M. Install - Mount and connect equipment and associated materials ready for use.

- N. Labeled - Refers to classification by a standards agency.
- O. Make - Refer to Article 1.09.
- P. Or Approved Equal - Approved equal or equivalent as determined by Owner's Representative.
- Q. Owner's Representative - The Prime Professional.
- R. Prime Professional - Architect or Engineer having a contract directly with the Owner for professional services.
- S. Provide - Furnish, install, and connect ready for use.
- T. Relocate - Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
- U. Replace - Remove and provide new item.
- V. Review - A general contractual conformance check of specified products.
- W. Roughing - Pipe, duct, conduit, equipment layout and installation.
- X. Satisfactory - As specified in contract documents.
- Y. Site Representative - Owner's inspector or "Clerk of Works" at the work site.

1.07. SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed. Submission of Shop Drawings and samples shall be accompanied by a transmittal letter, stating name of project and contractor, number of drawings, titles, and other pertinent data called for in individual sections. Shop Drawings shall be dated and contain name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at one time. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Shop Drawings will be given a general review only. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

1.08. PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.09. EQUIPMENT ARRANGMENTS

- A. The Contract Documents are prepared on basis of one manufacturer as "design equipment," even though other manufacturer's names are listed as acceptable makes. If Contractor elects to use one of the listed makes other than "design equipment," submit detailed drawings, indicating proposed installation of equipment. Show maintenance arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace door

frames, access doors, walls, ceilings, or floors required to install other than design make equipment. If revised arrangement submittal is rejected, revise and resubmit specified "design equipment" item which conforms to Contract Documents.

1.10. CONTINUITY OF SERVICES

- A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to General Conditions of the Contract for Construction for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical and plumbing connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/plumbing facilities or services.

1.11. ROUGHING

- A. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. DO NOT SCALE plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- B. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Where Contractor could not reasonably be expected to find such trade interferences due to concealment in walls, ceiling or floors, such relocations will be done by change order, if not, included in contract work. Contractor shall relocate existing work in way of new construction. VISIT SITE BEFORE BIDDING TO DETERMINE SCOPE OF WORK SINCE FEW OF SUCH ITEMS CAN BE SHOWN. Provide new materials, including new piping and insulation for relocated work.
- C. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with architectural drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and plumbing drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.
- D. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to ensure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:

1. Existing Equipment - Measure the existing equipment and prepare for installation in new location.
2. New Equipment - Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.12. REMOVAL WORK

- A. Where existing equipment removals are called for, submit complete list to Owner's Representative all items that Owner wishes to retain that do not contain asbestos or PCB Material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos and/or PCB's shall be in accordance with federal, state, and local law requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Removal all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawlspace, and roof to determine the total scope of work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

1.13. EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
1. Materials shall have a flame spread rating of 25 or less and smoke developed rating of 50 or less, in accordance with NFPA 255.
 2. All equipment and material for which there is a listing service shall bear a UL label.
 3. Potable water systems and equipment shall be built according to AWWA Standards.
 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 5. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

1.14. CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction work on the architectural drawings. Refer to "General Conditions of the Contract for Construction," for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch any cut or abandoned holes left by removals of equipment, fixtures, etc. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other

finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.15. PAINTING

- A. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one coat of primer and two finish coats or as called for in the mechanical and electrical specifications. Refer to General Construction Specifications for additional information.

1.16. CONCEALMENT

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.17. CHASES

A. New Construction

1. Certain chases, recessed, openings, shafts, and wall pockets will be provided as part of "General Building Construction Plans and Specifications." Mechanical and Electrical Trades work shall provide all other openings required for their contract work.
2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 inches above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

B. In Existing Buildings

1. Drill holes for floor and/or roof slab openings.
2. Multiple pipes smaller than 1 inch properly spaced and supported may pass through one 6-inch or smaller diameter opening.

3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 inches above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide firestopping seal between sleeves and wall in drywall construction. Provide firestopping similar to that for floor openings.

1.18. FLASHING, SEALING, FIRE-STOPPING

- A. See Section 15401, Plumbing Firestopping

1.19. SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Supports shall meet the approval of the Owner's Representative. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and Owner's Representative. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

1.20. ACCESS PANELS

- A. Access panels shall be furnished by the Mechanical and Plumbing Trades and installed by General Contractor. Location and size shall be the responsibility of each trade. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Contractor shall provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide General Contractor with a set of architectural black and white prints with size and approximate locations of access panels shown.

1.21. CONCRETE BASES

- A. Provide concrete bases for all floor-mounted equipment (unless otherwise noted). Provide 3,000-lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 inches high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.22. PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

- B. Provide roughing and final water, waste, vent, propane, etc. connections to all equipment. Provide loose key stops, sanitary “P” traps, tailpiece, adapters, gas cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves to point(s) of safe discharge.
- C. Provide as part of plumbing work valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.
- D. Install controls and devices furnished by others.
- E. Refer to Contract Documents for roughing schedules, and equipment lists indicating scope of connections required.
- F. Provide for Owner-furnished and Contractor-furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, wiring as required.
- G. Refer to manufacturer drawings and specifications for requirements of kitchen equipment, laboratory equipment and special equipment. Verify connection requirements before bidding.

1.23. STORAGE AND PROTECTION OF MATERIALS

- A. Store materials on dry base, at least 6 inches above ground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to General Conditions of the Contract for Construction.

1.24. FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no charge in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner’s operating staff.

1.25. OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner’s personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.26. MAINTENANCE MANUALS

- A. Prepare Instructions and Maintenance Portfolios. Include one copy of each of approved Shop Drawings, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of supplier manufacturer representative and service agency for all major equipment items in a three ring binder with name of project on the cover. Deliver to Owner's Representative before request for final acceptance.

1.27. RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one set of construction Contract Drawings including non-reproducible black and white prints for the purpose of recording record conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark each sheet of the non-reproducible drawings in pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, each sheet of record prints, plus all approved field sketches and diagrams shall be used in preparation of the record drawings.
- D. Completed drawings shall be certified as reflecting record conditions and submitted to the Engineer for approval.

1.28. ADDITIONAL ENGINEERING SERVICES

- A. In the event that the consultant is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the consultant is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then consultant's expenses in connection with such additional services shall be paid by the Contractor and may be deducted from any monies owed to the Contractor.

1.29. FINAL INSPECTION

- A. Upon completion of all punch list items, the Contractor shall provide a copy of the punch list back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final inspection.

1.30. ALL TRADES TEMPORARY HEAT

- A. Refer to the Standard General Conditions of the Contract for Construction and Supplementary General Conditions.

1.31. PLUMBING TEMPORARY FACILITIES

- A. Refer to the Standard General Conditions of the Contract for Construction and Supplementary General Conditions.

1.32. CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
- B. Thoroughly clean entire installation, both exposed surfaces and interiors.
- C. Remove all debris caused by work.
- D. Remove tools, surplus, materials, when work is finally accepted.

END OF SECTION

SECTION 15401

PLUMBING FIRESTOPPING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Firestopping materials.
- B. Firestopping of all penetrations, openings, and interruptions to fire rated assemblies, whether indicated on drawings or not, including but not limited to piping, tubing and similar utilities passing through or penetrating fire rated walls and floor assemblies.

1.02. REFERENCES

- A. ASTM International
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- B. National Fire Protection Association
 - 1. NFPA 70 - National Electrical Code.
- C. Underwriters Laboratories Inc.
 - 1. UL 263 - Fire Tests of Building Construction and Materials.
 - 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 - 3. UL 1479 - Fire Tests of Through-Penetration Firestops.
 - 4. UL - Fire Resistance Directory.
- D. Plumbing and Fuel Gas Codes of New York State.

1.03. FIRESTOP SYSTEM PERFORMANCE REQUIREMENTS

- A. General - For penetrations through fire resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire resistance rating of construction penetrated.

1. Fire resistance-rated walls including fire walls, fire partitions, fire barriers, and smoke barriers.
2. Fire resistance-rated horizontal assemblies including floors and ceiling membranes of roof/ceiling assemblies.

1.04. QUALITY ASSURANCE

- A. Fire Testing - Provide firestopping assemblies of designs which provide the specified fire ratings when tested in accordance with methods indicated.
 1. Listing in the current-year classification or certification books of UL will be considered as constituting an acceptable test report.

1.05. ENVIRONMENTAL REQUIREMENTS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Hilti.
- B. Nelson Fire Stop Products.
- C. Specified Technology.
- D. 3M Fire Protection Products.
- E. Approved equals meeting UL requirements.

2.02. MATERIALS

- A. Sealant Firestopping
 1. Intumescent firestop sealant designed to expand when exposed to fire.
 2. Paintable.
 3. Fire Resistance - Up to four hours.
 4. Curing Time - 14 to 21 days.
 5. Elongation - 5 percent.
 6. Density - 1.5 g/cm³.
 7. Product - FS-ONE Intumescent Firestop Sealant manufactured by Hilti USA.

8. Uses - Insulated and uninsulated metal pipes, with or without sleeve and plastic pipes.

B. Silicone Sealant Firestopping

1. Silicone based firestop sealant that provides maximum movement in fire-rated joint applications and pipe penetrations.
2. Not paintable.
3. Fire Resistance - Up to four hours.
4. Elongation - 25 percent.
5. Product - CP 601S Elastomeric Firestop Sealant manufactured by Hilti USA.
6. Uses - Joints in walls, floor to floor or fire compartments.

C. Safing Insulation

1. Mineral-wool type insulation.
2. Thickness - 1 inch to 1-1/2 inches.
3. Density - 4 to 8 pcf.
4. Product - THERMAFIBER Safing Insulation

D. Sleeves - Provide sleeves as required by Section 1206.4 of the Mechanical Code.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02. PREPARATION

- A. Surface Cleaning - Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.

- B. Priming - Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.03. INSTALLATION

- A. General - Install materials in manner described in UL detail and in accordance with manufacturer's instructions, completely closing openings.
- B. Installation
 - 1. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping and other items, requiring firestopping.
 - 2. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
 - 3. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
 - 4. Fire-Rated Surface
 - a. Seal opening at floor, wall, partition, and roof as follows:
 - 1) Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
 - 2) Size sleeve allowing minimum of 1 inch void between sleeve and building element.
 - 3) Pack void with backing material.
 - 4) Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.
 - b. Where plumbing piping penetrates a fire rated surface, install firestopping product in accordance with manufacturer's instructions.
 - 5. Non-Rated Surfaces
 - a. Seal opening through non-fire rated wall, floor, ceiling, and roof opening as follows:
 - 1) Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
 - 2) Size sleeve allowing minimum of 1-inch void between sleeve and building element.
 - 3) Install type of firestopping material recommended by manufacturer.

- b. Install floor plates or ceiling plate where piping penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
 - c. Exterior Wall Openings Below Grade - Assemble rubber links of mechanical seal to size of piping and tighten in place, in accordance with manufacturer's instructions.
- C. Identification - Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Date of installation.
 - 3. Through-penetration firestop system manufacturer's name.

3.04. CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

END OF SECTION

SECTION 15402

PLUMBING IDENTIFICATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Nameplates.
- B. Pipe markers.

1.02. REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.03. SUBMITTALS

- A. Product Data - Provide manufacturers' catalog literature for each product required.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Seton Identification Products.
- B. Brady Corporation.
- C. Emed Company.
- D. Approved Equal.

2.02. NAMEPLATES

- A. Description - Laminated three-layer plastic with engraved letters.
 - 1. Letter Color - White.
 - 2. Letter Height - 3/8 inch.
 - 3. Nameplate Height - 3/4 inch.
 - 4. Background Color - Black.

2.03. PIPE MARKERS AND ACCESSORIES

- A. Snap-on Marker - One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4-inch adhesive strip on inside edge, and 360-degree visibility.

- B. Strap-on Marker - Strip type constructed of precoiled acrylic plastic polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.
- C. Stick-on Marker - Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.
- D. Pipe Marker Legend
 - 1. Outside Diameter of Pipe or Insulation $\frac{3}{4}$ to 1- $\frac{1}{4}$ inch
 - a. Letter Size - $\frac{1}{2}$ inch.
 - b. Length of Color Field 0 8 inches.
 - 2. Outside Diameter of Pipe or Insulation 1- $\frac{1}{2}$ to 2 inches
 - a. Letter Size - $\frac{3}{4}$ inch.
 - b. Length of Color Field - 8 inches.
 - 3. Outside Diameter of Pipe or Insulation 2- $\frac{1}{2}$ to 6 inches
 - a. Letter Size - 1- $\frac{1}{4}$ inch.
 - b. Length of Color Field - 12 inches.
 - 4. Outside Diameter of Pipe or Insulation 8 inches and Greater
 - a. Letter Size - 2- $\frac{1}{2}$ inch.
 - b. Length of Color Field - 18 inches.
- E. Color - Conform to ANSI A13.1.
- F. Banding Tapes - Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.
 - 1. Plain Tape - Unprinted type; color to match pipe marker background.
 - 2. Flow Arrow Tape - Printed type with integral flow arrows; color to match pipe marker background.

PART 3 EXECUTION

3.01. PREPARATION

- A. Complete testing, insulation, and finish painting work prior to completing the Work of this Section.

- B. Clean pipe and equipment surfaces with cleaning solvents prior to installing piping identification or equipment tags.
- C. Remove dust from insulation surfaces with clean clothes prior to installing piping or equipment identification.

3.02. INSTALLATION

- A. Install the work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Nameplates - Install plastic nameplates on properly prepared and dry surface with adhesive and ensure permanent adhesion.
- C. Stick-On Pipe Markers
 - 1. Install minimum of two markers at each specified location, 90 degrees apart on visible side of pipe.
 - 2. Encircle ends of pipe markers around pipe or insulation with banding tape with 1-inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.

3.03. PIPING IDENTIFICATION

- A. Piping Identification Types
 - 1. Piping or Insulation 3/4 Inch and Larger - Snap-on pipe markers or stick-on pipe markers.
- B. Identify exposed piping, bare or insulated, as to content and direction of flow, with the following exceptions:
 - 1. Piping in non-walk-in tunnels or underground conduits between manholes.
 - 2. Piping in furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.
 - 3. Piping exposed in finished spaces such as offices, classrooms, wards, toilet rooms, shower rooms, and corridors.
- C. Locate piping identification to be visible from exposed points of observation.
 - 1. Locate piping identification at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs.
 - 2. Where two or more pipes run in parallel, place printed legend and other markers in same relative location.

3.04. EQUIPMENT IDENTIFICATION

- A. Identify uninsulated plumbing equipment by means of plastic nameplates.

1. Letter Size - 3/8 inches height.
- B. Small in-line pumps may be identified with tags equivalent as specified for pipe service.
- C. Locations - Co-locate nameplates with manufacturer's equipment nameplates where readily visible. Where view of manufacturers nameplate is obstructed locate nameplate to be readily visible.
- D. Equipment Identification Legend - Equipment identification shall match tags as scheduled on drawings.

END OF SECTION

SECTION 15410
PLUMBING PIPING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.

1.02. REFERENCE STANDARDS

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).
- B. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005) (ANSI B16.18).
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
- E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers; 2002.
- F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers; 2007.
- G. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers; 2007 (ANSI/ASME B31.1).
- H. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2008 (ANSI/ASME B31.9).
- I. ASTM A 234/A 234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2007.
- J. ASTM B 32 - Standard Specification for Solder Metal; 2008.
- K. ASTM D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2006.
- L. ASTM D 2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2009.

- M. ASTM D 2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2006.
- N. ASTM D 2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2004 (Reapproved 2009).
- O. ASTM D 2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2009.
- P. ASTM D 2846/D 2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2009b.
- Q. ASTM D 2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2002).
- R. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2008.
- S. ASTM F 437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2009.
- T. ASTM F 438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40; 2009.
- U. ASTM F 439 - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2009.
- V. ASTM F 441/F 441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80; 2009.
- W. ASTM F 442/F 442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR); 2009.
- X. ASTM F 493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2004.
- Y. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).
- Z. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.
- AA. MSS SP-67 - Butterfly Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2002a.
- AB. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- AC. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2008.

- AD. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 1996.

1.03. SUBMITTALS

- A. Product Data - Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.04. QUALITY ASSURANCE

- A. Perform work in accordance with State of New York standards.
 - 1. Maintain one copy on project site.
- B. Valves - Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures - Conform to ASME (BPV IX) and applicable state labor regulations.
- D. Welder Qualifications - Certified in accordance with ASME (BPV IX).
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.05. REGULATORY REQUIREMENTS

- A. Perform work in accordance with State of New York Plumbing Code.
- B. Conform to applicable code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07. FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01. SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe - ASTM A 74, service weight.
 - 1. Fittings - Cast iron.
 - 2. Joint Seals - ASTM C 564 neoprene gaskets.
- B. Cast Iron Pipe - CISPI 301, hubless, service weight.
 - 1. Fittings - Cast iron.
 - 2. Joints - CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. PVC Pipe - ASTM D 2665.
 - 1. Fittings - PVC.
 - 2. Joints - Solvent welded, with ASTM D 2564 solvent cement.

2.02. WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Copper Pipe - ASTM B 42, hard drawn.
 - 1. Fittings - ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints - ASTM B 32, alloy Sn95 solder.

2.03. POTABLE WATER PIPING, ABOVE GRADE

- A. Copper Tube - ASTM B 88 (ASTM B 88M), Type L (B), Drawn (H).
 - 1. Fittings - ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints - ASTM B 32, alloy Sn95 solder.
- B. CPVC Pipe - ASTM D 1785 or ASTM D 2241.
 - 1. Fittings - ASTM D 2665, CPVC.
 - 2. Joints - ASTM D 2846/D 2846M, solvent weld with ASTM F 493 solvent cement.
- C. PVC Pipe - ASTM D 1785 or ASTM D 2241.
 - 1. Fittings - ASTM D 2665, PVC.
 - 2. Joints - ASTM D 2846/D 2846M, solvent weld with ASTM F 493 solvent cement.

2.04. FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Ferrous Pipe Sizes 3 inches and Under - Class 150 malleable iron threaded unions.
- B. Unions for Copper Tube and Pipe 2 inches and Under - Class 150 bronze unions with soldered joints.
- C. Flanges for Pipe Size Over 1 inch
 - 1. Ferrous Pipe - Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe - Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- D. Dielectric Connections - Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.05. PIPE HANGERS AND SUPPORTS

- A. All plumbing piping shall be supported in accordance with the Plumbing Code of New York State. Hangers, anchors and supports shall support the piping and the contents of the piping. Hangers and strapping shall be of approved material that will not promote galvanic action.
- B. Plumbing Piping - Drain, Waste, and Vent
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 inch to 1-1/2 inches - Malleable iron, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 inches and Over - Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers - Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 inches - Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 inches and Over - Welded steel bracket and wrought steel clamp.
 - 7. Vertical Support - Steel riser clamp.
 - 8. Floor Support - Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Copper Pipe Support - Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water
 - 1. Conform to ASME B31.9.

2. Hangers for Pipe Sizes 1/2 inch to 1-1/2 inches - Malleable iron, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 inches and Over - Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 inches to 4 inches - Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 inches and Over - Adjustable steel yoke, cast iron pipe roll, double hanger.
 6. Multiple or Trapeze Hangers - Steel channels with welded supports or spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Over - Steel channels with welded supports or spacers and hanger rods, cast iron roll.
 8. Wall Support for Pipe Sizes to 3 inches - Cast iron hook.
 9. Wall Support for Pipe Sizes 4 inches and Over - Welded steel bracket and wrought steel clamp.
 10. Wall Support for Hot Pipe Sizes 6 inches and Over - Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
 11. Vertical Support - Steel riser clamp.
 12. Floor Support for Cold Pipe - Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 13. Floor Support for Hot Pipe Sizes to 4 inches - Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
 14. Floor Support for Hot Pipe Sizes 6 inches and Over - Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
 15. Copper Pipe Support - Carbon steel ring, adjustable, copper plated.
- D. All pipe hangers and supports in wet, corrosive, hazardous, or exterior locations shall have stainless steel support rods, stainless steel mounting hardware, stainless steel fasteners, and stainless steel concrete inserts. All non-stainless steel parts of the hangers and supports shall be PVC coated.

2.06. GATE VALVES

A. Manufacturers:

1. Conbraco Industries - www.conbraco.com.
2. Nibco, Inc - www.nibco.com.
3. Milwaukee Valve Company - www.milwaukeevalve.com.
4. Approved Equal.

- B. Up To and Including 3 inches - MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder ends.
- C. 2 inches and Larger - MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.07. GLOBE VALVES

- A. Manufacturers
 - 1. Conbraco Industries - www.conbraco.com.
 - 2. Nibco, Inc - www.nibco.com.
 - 3. Milwaukee Valve Company - www.milwaukeevalve.com.
 - 4. Approved Equal.
- B. Up To and Including 3 inches - MSS SP-80, Class 125, bronze body, bronze trim, handwheel, bronze disc, solder ends.
- C. 2 inches and Larger - MSS SP-85, Class 125, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.08. BALL VALVES

- A. Manufacturers
 - 1. Conbraco Industries - www.conbraco.com.
 - 2. Nibco, Inc - www.nibco.com.
 - 3. Milwaukee Valve Company - www.milwaukeevalve.com.
 - 4. Approved Equal.
- B. Construction, 4 inches and Smaller - MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, full port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

2.09. BUTTERFLY VALVES

- A. Manufacturers
 - 1. Hammond Valve - www.hammondvalve.com.
 - 2. Crane Co. - www.cranevalve.com.
 - 3. Milwaukee Valve Company - www.milwaukeevalve.com.
 - 4. Approved Equal.

- B. Construction 1-1/2 inches and Larger - MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.10. SWING CHECK VALVES

- A. Manufacturers
 - 1. Hammond Valve - www.hammondvalve.com.
 - 2. Nibco, Inc - www.nibco.com.
 - 3. Milwaukee Valve Company - www.milwaukeevalve.com.
 - 4. Approved Equal.
- B. Up to 2 inches - MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.
- C. Over 2 inches - MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.11. SPRING-LOADED CHECK VALVES

- A. Manufacturers
 - 1. Hammond Valve - www.hammondvalve.com.
 - 2. Crane Co. - www.cranevalve.com.
 - 3. Milwaukee Valve Company - www.milwaukeevalve.com.
 - 4. Approved Equal.
- B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.12. RELIEF VALVES

- A. Pressure Relief
 - 1. Manufacturers
 - a. Cla-Val Co - www.cla-val.com.
 - b. Henry Technologies - www.henrytech.com.
 - c. Watts Regulator Company - www.wattsregulator.com.
 - d. Approved Equal.

2. AGA Z21.22 certified, bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated.

B. Temperature and Pressure Relief

1. Manufacturers
 - a. Cla-Val Co - www.cla-val.com.
 - b. Henry Technologies - www.henrytech.com.
 - c. Watts Regulator Company - www.wattsregulator.com.
 - d. Approved Equal.
2. AGA Z21.22 certified, bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

2.13. STRAINERS

A. Manufacturers

1. Armstrong International, Inc - www.armstronginternational.com.
2. Green Country Filtration - www.greencountryfiltration.com.
3. WEAMCO - www.weamco.com.
4. Approved Equal.

B. Size 2 inch and Under

1. Threaded brass body for 175 psi CWP, Y pattern with 1/32-inch stainless steel perforated screen.
2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32-inch stainless steel perforated screen.

C. Size 1-1/2 inch to 4 inch - Class 125, flanged iron body, Y pattern with 1/16-inch stainless steel perforated screen.

D. Size 5 inch and Larger - Class 125, flanged iron body, basket pattern with 1/8-inch stainless steel perforated screen.

2.14. PIPING SCHEDULE

- A. Provide piping in accordance with the following schedule or as otherwise noted on the Drawings:

Application (Unclassified, Dry Areas)	Sizes	Pipe	Joint
Water (Potable and Non-Potable)	3" or less	L copper	Soldered
Water (Potable and Non-Potable)	Above 3"	Ductile Iron	Flanged

Application (Process Areas)	Sizes	Pipe	Joint
Water (Potable, Non-Potable, Plant Water)	Above 3"	Ductile Iron	Flanged
Plant Water	3" or less	PVC Schedule 80	Solvent
Non-Potable Water	3" or less	PVC Schedule 80	Solvent
Domestic Hot, Tempered, and Cold Potable Water	3" or less	CPVC Schedule 80	Solvent
Tempered Water - Plant	3" or less	CPVC Schedule 80	Solvent

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02. PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 15053, Expansion Fittings and Flexible Connections.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 15411, Plumbing Supply Insulation.
- H. Provide access where valves and fittings are not exposed.

- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly. Terminate at least 18 inches above roof.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- K. Provide support for utility meters in accordance with requirements of utility companies.
- L. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09900, Painting.
- M. Excavate in accordance with Section 02222, Excavating.
- N. Backfill in accordance with Section 02223, Backfilling.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- R. Use non-hardening pipe dope on gas piping threads; do not use thread seal tape.
- S. PVC Pipe - Make solvent-welded joints in accordance with ASTM D 2855.
- T. Sleeve pipes passing through partitions, walls and floors.
- U. Inserts
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- V. Pipe Hangers and Supports
 - 1. Support horizontal piping as scheduled.
 - 2. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
 - 3. Place hangers within 12 inches of each horizontal elbow.

4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
5. Support vertical piping as scheduled.
6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
7. Provide copper plated hangers and supports for copper piping.
8. Prime coat exposed steel hangers and supports. Refer to Section 09900, Painting. Hangers and supports located in crawlspaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
9. Provide hangers adjacent to motor driven equipment with vibration isolation. Refer to Section 15054, Vibration and Seismic Controls for HVAC Piping and Equipment .
10. Support cast iron drainage piping at every joint.

3.04. APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe valves for throttling, bypass, or manual flow control services.
- E. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- F. Provide spring loaded check valves on discharge of water pumps.
- G. Provide plug valves in natural gas systems for shut-off service.

3.05. TOLERANCES

- A. Drainage Piping - Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope for pipes 2-1/2-inch diameter and less, 1/8 inch per foot slope for pipes 3 to 6 inches in diameter and 1/16 inch per foot slope for pipes 8 inches and larger in diameter.
- B. Water Piping - Slope at minimum of 1/32 inch per foot and arrange to drain at low points with capped drain valves.

3.06. TESTING AND INSPECTIONS

- A. New plumbing systems and parts of existing systems that have been altered, extended or repaired shall be tested in accordance with the Plumbing Code of New York State or the authority having jurisdiction to disclose leaks and defects.

- B. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction work, and at other times as directed. Perform test operations in sections as required and directed, to progress the work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the work.
- C. The Contractor shall make the applicable tests prescribed below to determine compliance with the provisions of the Plumbing Code of New York State. The Contractor shall give reasonable advance notice to the code official when the plumbing work is ready for tests. The equipment, material, power and labor necessary for the inspection and test shall be furnished by the Contractor. All plumbing system piping shall be tested with either water or air. Plastic piping shall not be tested with air.
- D. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.
- E. Required Inspections - Final inspection shall be made after the building is completed, all plumbing fixtures are in place and properly connected, and the structure is ready for occupancy.
- F. Domestic Water (Potable Cold, Domestic Hot and Recirculation) Inside Buildings
 - 1. Before fixtures, faucets, trim and accessories are connected, perform hydrostatic test at 125 psig minimum for 4 hours.
 - 2. After fixtures, faucets, trim and accessories are connected, perform hydrostatic retest at 75 psig for 4 hours.
 - 3. The water utilized for the tests shall be obtained from a potable water source of supply.
- G. Inspection and Testing of Backflow Prevention Assemblies
 - 1. Backflow prevention assemblies shall be tested at the time of installation and immediately after repairs or relocation.
 - 2. The testing procedure shall be performed in accordance with one of the following standards:
 - a. ASSE Series 5000 - Standards 5013, 5015, 5020, 5047, 5052 or 5056.

3.07. DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. New and repaired potable water systems shall be purged of deleterious matter and disinfected prior to utilization.
- B. The method to be followed for the disinfection of potable water systems shall be in accordance with the applicable NYSDOH regulations.

1. Completely fill the piping, including water storage equipment if installed, with a water solution containing 50 mg/L available chlorine and allow to stand for 24 hours. Operate all valves during this period to ensure their proper disinfection. After the 24-hour period, the chlorine residual shall be 25 mg/L or greater. If not, flush and repeat chlorination procedure.
 2. After the retention period, discharge the solution into an approved waste and flush the system thoroughly with potable water until substantially all traces of chlorine are removed. Drain and flush water storage equipment if installed.
- C. Collect samples for bacteriological analysis in accordance with AWWA C651.
- D. Repeat procedure if bacteriological results are not satisfactory.
- E. Submit bacteriological test results to the Architect/Engineer prior to placing the system in service. Prevent re-contamination of the piping during this phase of the work.

3.08. SCHEDULES

A. Pipe Hanger Spacing

1. CPVC Pipe or Tubing
 - a. 1-inch Diameter and Smaller
 - 1) Maximum Horizontal Spacing - 3 feet.
 - 2) Maximum Vertical Spacing - 10 feet. (midstory guide for sizes 2 inches and smaller).
 - b. 1-1/4-inch Diameter and Larger
 - 1) Maximum Horizontal Spacing - 4 feet.
 - 2) Maximum Vertical Spacing - 10 feet. (midstory guide for sizes 2 inches and smaller).
2. PVC Pipe - All Sizes
 - a. Maximum Horizontal Spacing - 4 feet.
 - b. Maximum Vertical Spacing - 10 feet (midstory guide for sizes 2 inches and smaller).
3. Cast Iron Piping - All Sizes
 - a. Maximum Horizontal Spacing - 5 feet. (may be increased to 10 feet where 10-foot pipe lengths are installed)
 - b. Maximum Vertical Spacing - 15 feet.

4. Copper or Copper-Alloy Tubing.
 - a. 1-1/4 inch Diameter and Smaller
 - 1) Maximum Horizontal Spacing - 6 feet.
 - 2) Maximum Vertical Spacing - 10 feet.
 - b. 1-1/2-inch Diameter and Larger
 - 1) Maximum Horizontal Spacing - 10 feet.
 - 2) Maximum Vertical Spacing - 10 feet.
5. Steel Piping - All Sizes
 - a. Maximum Horizontal Spacing - 12 feet.
 - b. Maximum Vertical Spacing - 15 feet.

B. The materials of construction for all hangers and supports shall be in accordance with the following:

Area	Acceptable Materials
EXTERIOR:	
Exposed to Outdoor Conditions, Inside Tanks, Submerged Locations Unless Otherwise Specified	Stainless Steel
Inside Tanks	
Submerged Locations Unless Otherwise Specified	
INTERIOR:	
Corrosive or Wet/Corrosive Areas (either Unclassified or Hazardous)	
Interior Sodium Hypochlorite Storage and Feed Areas	FRP
Unclassified, Unclassified/Wet Areas	
Pump Room	Stainless Steel
Piping Galleries	
Below-Grade Vaults, Manholes, and Handholes	
Polymer Storage and Feed Areas	
Hazardous, Hazardous/Wet Areas	
NEC Class I, Division 1 or 2, Groups C and D	Stainless Steel

END OF SECTION

SECTION 15411

PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02. REFERENCE STANDARDS

- A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2007.
- B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2004.
- C. ASTM C 195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007.
- D. ASTM C 449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007.
- E. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2004.
- F. ASTM C 533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2009.
- G. ASTM C 534/C 534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2008.
- H. ASTM C 547 - Standard Specification for Mineral Fiber Pipe Insulation; 2007.
- I. ASTM C 610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation; 2009.
- J. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2010.
- K. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.
- L. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03. SUBMITTALS

- A. Product Data - Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.04. QUALITY ASSURANCE

- A. Manufacturer Qualifications - Company specializing in manufacturing the products specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications - Company specializing in performing the type of work specified in this section with minimum five years of documented experience.
- C. Regulatory Requirements - Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84, NFPA 255, and UL 723.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06. FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01. PIPING INSULATION

- A. Fibrous Glass (Mineral Fiber) Insulation - Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
 - 1. Manufacturers
 - a. Johns Manville Corporation.
 - b. Knauf Fiber Glass.
 - c. Owens Corning Corporation.
 - 2. Preformed Pipe Insulation - Minimum density 3 pcf; ASTM C 547.
 - a. Class 1 (Suitable for Temperatures Up to 450 degrees F) - 'K' value of 0.26 at 75 degrees F.
 - 3. Premolded Fitting Insulation - Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.

4. Insulation Inserts for PVC Fitting Jackets - Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.

- a. Suitable for temperatures up to 450 degrees F.

. High Density Jacketed Insulation Inserts for Hangers and Supports

1. Manufacturers

- a. Johns Manville Corporation.

- b. Knauf Fiber Glass.

- c. Owens Corning Corp.

2. For Use with Fibrous Insulation

- a. Cold Service Piping

- 1) Polyurethane Foam - Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.

- b. Hot Service Piping

- 1) Calcium Silicate - Minimum density of 15 pcf, K of 0.50 at 300 degrees F; ASTM C 610.

- 2) Perlite - Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C610.

3. For Use with Flexible Elastomeric Foam Insulation - Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as required.

C. Cements

1. Fibrous Glass Thermal Insulating Cement - Asbestos free; ASTM C 195.

2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement - ASTM C 449/C 449M.

2.02. INSULATION JACKETS AND FITTING COVERS

- A. Laminated Vapor Barrier Jackets for Piping Insulation - Factory applied by insulation manufacturer, conforming to ASTM C 1136, Type I.

1. Type I - Reinforced white kraft and aluminum foil laminate with kraft facing out.

- a. Pipe Jackets - Furnished with integral 1-1/2 inch self-sealing longitudinal lap, and separate 3 inch wide adhesive backed butt strips.

2. Type II - Reinforced aluminum foil and kraft laminate with foil facing out.

3. Laminated vapor barrier jackets are not required for flexible elastomeric foam insulation.
- B. Canvas Jacket - Cotton duck, fire retardant, complying with NFPA 701, 4 oz/sq yd. or 6 oz/sq yd as specified.
- C. Premolded PVC Fitting Jackets
 1. Constructed of high impact, UV-resistant PVC.
 - a. ASTM D 1784, Class 14253-C.
 - b. Working Temperature - 0 to 150 degrees F.

2.03. ADHESIVES, MASTICS, AND SEALERS

- A. Lagging Adhesive (Canvas Jackets) - Childers' CP-50A, Epolux's Cadalag 336, Foster's 30-36.
- B. Vapor Seal Adhesive (Fibrous Glass Insulation) - Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-75 or 85-20.
- C. Vapor Barrier Mastic/Joint Sealer (Fibrous Glass Insulation) - Childers' CP-30, Epolux's Cadalar 670, Foster's 95-44 or 30-35.
- D. Adhesive (Flexible Elastomeric Foam) - Armstrong's 520, Childers' CP-80, Epolux's Cadoprene 488, Foster's 82-40.
- E. Adhesive (Reinforcing Membrane) - Childers' Chil-Spray WB CP-56.
- F. Mastic (Reinforcing Membrane) - Childers' AK-CRYL CP-9.
- G. Sealant (Metal Pipe Jacket) - One-part silicone sealant for high temperatures; Dow Corning's Silastic 736 RTV or General Electric's RTV 106.

2.04. MISCELLANEOUS MATERIALS

- A. Insulation Fasteners
 1. Acceptable Manufacturers - Duro-Dyne Corp.; Erico Fastening Systems, Inc.
 2. Type - Weld pins, complete with self-locking insulation retaining washers.
- B. Pressure Sensitive Tape for Sealing Laminated Jackets
 1. Acceptable Manufacturers - Alpha Associates, Childers, Ideal Tape, Morgan Adhesive.
 2. Type - Same construction as jacket.
- C. Wire, Bands, and Wire Mesh
 1. Binding and Lacing Wire - Nickel copper alloy or copper clad steel.

2. Bands - Galvanized steel, 1/2-inch wide x 0.015-inch thick, with 0.032 inch thick galvanized wing seals.
 3. Wire Mesh - Woven 20 gage steel wire with 1-inch hexagonal openings, galvanized after weaving.
- D. Reinforcing Membrane - Glass or Polyester, 10 x 10 mesh. Alpha Associates Style 59, Childers Chil-Glas, Foster's MAST-A-FAB.

PART 3 EXECUTION

3.01. PREPARATION

- A. Perform the following prior to starting insulation work:
1. Install all hangers, supports, and appurtenances in their permanent locations.
 2. Complete testing of piping.
 3. Clean and dry all surfaces to be insulated.

3.02. INSTALLATION, GENERAL

- A. Install the work of this section in accordance with manufacturer's printed installation instructions unless otherwise specified.
- B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.
1. At Through Penetration Firestops - Coordinate insulation densities with the requirements of approved firestop system being installed. See Section 15401, Plumbing Firestopping.
 - a. Insulation densities required by approved firestop system may vary with the densities specified in this section. When this occurs, use the higher density insulation.
- C. Individual piping runs shall have consistent insulation type.
- D. Apply Insulation to completely cover entire surface of piping. Do not insulate over weld certification stamps.
- E. Piping being installed exposed to interior space shall be installed with a PVC jacketing.

3.03. INSTALLATION AT HANGERS AND SUPPORTS

- A. Reset and realign hangers and supports if they are displaced during insulation installation.

- B. Install high density jacketed insulation inserts at hangers and supports for insulated piping as specified.

1. Insulation Inserts For Use with Fibrous Glass Insulation

- a. Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.
- b. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, or trapezes, fully encircle pipe with two protection shields and two high density jacketed fibrous glass insulation inserts within supporting members.
 - 1) Exception - Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.

2. Insulation Inserts For Use with Flexible Elastomeric Foam Insulation

- a. Where clevis hangers are used, install insulation shields with hardwood filler pieces, same thickness as adjoining insulation, inserted in undersized die cut or slotted holes in insulation at support points.
- b. Where hardwood blocks are used, contour to match the curvature of pipe, and shield.
- c. Coat dowels and blocks with insulation adhesive, and insert while still wet.
- d. Vapor seal outer surfaces of dowels and blocks with adhesive after insertion.
- e. Provide minimum two dowels plugs or one filler block per hanger.

3.04. INSTALLATION OF FIBROUS GLASS COLD SERVICE INSULATION

- A. Install insulation materials with a field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket, unless otherwise specified.

B. Piping

- 1. Butt insulation joints together.
- 2. Continuously seal joints with minimum 1-1/2-inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips, or 3-inch wide pressure sensitive sealing tape of same material as jacket.
- 3. Bed insulation in a 2-inch wide band of vapor barrier mastic and vapor seal exposed ends of insulation with vapor barrier mastic at each butt joint between pipe insulation and equipment, fittings, or flanges at the following intervals:
 - a. Horizontal Pipe Runs - 21 feet.
 - b. Vertical Pipe Runs - 9 feet.

C. Fittings, Valves, Flanges and Irregular Surfaces

1. Insulate with mitre cut or pre-molded fitting insulation of same material and thickness as adjoining pipe insulation.
2. Secure insulation in place with 16 gage wire, with ends twisted and turned down into insulation.
3. Butt fitting, valve, and flange insulation against pipe insulation and bond with insulating cement.
4. Insulate valves up to and including bonnets, without interfering with packing nuts.
5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
6. When insulating cement has dried, seal fitting, valve and flange insulation by embedding a layer of reinforcing membrane of 4 oz. canvas jacket between two flood coats of vapor barrier mastic, each 1/8 inch thick wet.
7. Lap reinforcing membrane or canvas on itself and adjoining pipe insulation at least 2 inches.
8. Trowel, brush, or rubber glove outside coat over entire insulated surface.

D. Fittings, Valves, Flanges and Irregular Surfaces - Alternate

1. Apply one piece pre-molded PVC fitting covers with fibrous glass insulation inserts with galvanized coated tack fasteners. Tape circumferential joint between insulation and premolded fitting cover with 2 inch wide pressure sensitive polyvinyl tape.
 - a. Exception - Provide additional insulation inserts on service operating at under 45 degrees F or where insulation thickness exceeds 1-1/2 inches. Ensure that insulation is adequate to prevent PVC fitting jacket temperature from falling below 45 degrees F.

3.05. INSTALLATION OF FIBROUS GLASS HOT SERVICE INSULATION

- A. Install insulation materials with field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket unless otherwise specified.
- B. Canvas Jackets on Piping, Fittings, Valves, Flanges, Unions, and Irregular Surfaces
 1. For Piping 2-inch size and Smaller - 4 oz per sq yd unless otherwise specified.
 2. For Piping Over 2-inch size - 6 oz per sq yd unless otherwise specified.
- C. Piping
 1. Butt insulation joints together.

2. Continuously seal joints with minimum 1-1/2-inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips, or 3-inch wide pressure sensitive sealing tape of same material as jacket.
3. Fill voids in insulation at hanger with insulating cement.
4. Exceptions
 - a. Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Spaces, and Concealed Piping - Butt insulation joints together and secure with minimum 1-1/2-inch wide longitudinal jacket laps and 3-inch wide butt strips of same material as jacket, with outward clinching staples on maximum 4-inch centers. Fill voids in insulation at hangers with insulating cement.
 - b. Piping in Tunnels - Butt insulation joints together and secure with minimum 1-1/2-inch wide longitudinal jacket laps and 3-inch wide butt strips, of same material as jacket, with outward clinching staples on maximum 4-inch centers and 16 gage wires a minimum of four loops per section. Fill voids in insulation with insulating cement.
5. Fittings, Valves, Flanges and Irregular Surfaces
 - a. Insulate with mitre cut or pre-molded fitting insulation of same material and thickness as adjoining pipe insulation.
 - b. Secure insulation in place with 16 gage wire, with ends twisted and turned down into insulation.
 - c. Butt fitting, valve, and flange insulation against pipe insulation and bond with insulating cement.
 - d. Insulate valves up to and including bonnets, without interfering with packing nuts.
 - e. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
 - f. When insulating cement has dried, coat insulated surface with lagging adhesive, and apply 4 oz. or 6 oz. canvas jacket as required by pipe size.
 - 1) Lap canvas jacket on itself and adjoining pipe insulation at least 2 inches.
 - 2) Size entire canvas jacket with lagging adhesive.
 - g. Exceptions
 - 1) Insulate fittings, valves, and irregular surfaces 3-inch size and smaller with insulating cement covered with 4- or 6-oz canvas jacket as required by pipe size. Terminate pipe insulation adjacent to flanges and unions with insulating cement, troweled down to pipe on a bevel.

- 2) Sizing of canvas surface is not required on fittings, valves, flanges, and irregular surfaces in concealed piping, piping in accessible shafts, attic spaces, crawlspaces, unfinished spaces, and tunnels.
6. Fittings, Valves, Flanges and Irregular Surfaces - Alternate
 - a. Apply one-piece pre-molded PVC fitting covers with fibrous glass insulation inserts with galvanized coated tack fasteners. Tape circumferential joint between insulation and premolded fitting cover with 2-inch wide pressure-sensitive polyvinyl tape.
 - 1) Exception - Provide additional insulation inserts on service operating at over 250 degrees F or where insulation thickness exceeds 1-1/2 inches. Ensure that insulation is adequate to prevent PVC fitting jacket temperature from exceeding 150 degrees F.

3.06. SCHEDULE OF PIPING INSULATION

- A. Insulate all cold service and hot service piping, and appurtenances except where otherwise specified.
- B. Plumbing Piping Systems
 1. Domestic Hot Water Supply (105 to 140 degrees F)
 - a. Glass Fiber Insulation
 - 1) Pipe Size Range - Up to 1-1/2 inch.
 - a) Thickness - 1 inch.
 - 2) Pipe Size Range - Over 1-1/2 inch.
 - a) Thickness - 2 inch.
 2. Tempered Domestic Water Supply
 - a. Glass Fiber Insulation
 - 1) Pipe Size Range - Up to 1-1/2 inch.
 - a) Thickness - 1 inch.
 - 2) Pipe Size Range - Over 1-1/2 inch.
 - a) Thickness - 2 inch.

3. Domestic and non-potable Cold Water:

a. Glass Fiber Insulation

1) Pipe Size Range - All sizes.

a) Thickness - 3/4 inch.

C. Schedule of Items Not to be Insulated

1. Chrome-plated piping, unless otherwise specified.
2. Water heater blowoff piping.
3. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves.
4. Water meters.
5. Sprinkler and standpipe piping, unless otherwise specified.

3.07. PIPING INSULATION SCHEDULE

A. The following insulation and jacket types are referenced in the insulation schedule:

1. Insulation Types

Type	Description
1	Glass Fiber
2	Elastomeric
3	Cellular Glass
4	Mineral Fiber
5	Polyethylene

2. Jacket Types

Type	Description
A	All Service Jacket
B	All Service Jacket with Vapor Barrier
C	PVC Jacket
D	Aluminum Jacket
E	Canvas Jacket

B. Insulation Schedule – Provide insulation types and thickness as indicated in table below.

Piping Systems	Pipe Size (inches)	Insulation Type	Jacket Type	Insulation Thickness
Plumbing				
Tempered Water	All	1	A and C ⁽¹⁾	1” minimum
Potable Water - Cold	3” and Smaller	1	B and C ⁽¹⁾	3/4” minimum
Potable Water - Hot	All	1	A and C ⁽¹⁾	1” minimum
Non Potable Water	3” and Smaller	1	B and C ⁽¹⁾	3/4” minimum

⁽¹⁾ Not required for piping above suspended ceilings and inside pipe chases. In mechanical rooms (i.e., boiler rooms), painted canvas jacket is acceptable.

END OF SECTION

SECTION 15420

PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Backflow preventers.
- E. Water hammer arrestors.
- F. Air Vents.
- G. Floor drain trap seals.

1.02. REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains; 2001 (R2007).
- B. ASSE 1011 - Hose Connection Vacuum Breakers; 2004.
- C. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; 2009.
- D. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011.
- E. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.
- F. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- G. NSF 372 - Drinking Water System Components - Lead Content; 2011.
- H. PDI-WH 201 - Water Hammer Arresters; 2010.

1.03. SUBMITTALS

- A. Product Data - Provide component sizes, rough-in requirements, service sizes, and finishes.

PART 2 PRODUCTS

2.01. GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems - Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02. DRAINS

A. Manufacturers

1. Jay R. Smith Manufacturing Company - www.jayrsmith.com.
2. Zurn Industries, LLC - www.zurn.com.
3. Approved Equal.

- B. Floor Drain - ASME A112.6.3; lacquered cast iron or stainless steel, two-piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.03. CLEANOUTS

A. Manufacturers

1. Jay R. Smith Manufacturing Company - www.jayrsmith.com.
2. Zurn Industries, LLC - www.zurn.com.
3. Approved Equal.

- B. Cleanouts at Interior Finished Floor Areas - Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

2.04. HOSE BIBBS

A. Manufacturers

1. Jay R. Smith Manufacturing Company - www.jayrsmith.com.
2. Watts Regulator Company - www.wattsregulator.com.
3. Zurn Industries, LLC - www.zurn.com.
4. Approved Equal.

- B. Interior Hose Bibbs - Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in conformance with ASSE 1011.

1. Hose bibbs to be stainless steel in all exterior locations (exposed to outdoor conditions) and interior wet areas (wet well).

- C. Hydrants – ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

2.05. BACKFLOW PREVENTERS

A. Manufacturers

1. Watts Regulator Company, a part of Watts Water Technologies - www.wattsregulator.com.
2. Zurn Industries, LLC - www.zurn.com.
3. Approved Equal.

- B. Reduced Pressure Backflow Preventers - ASSE 1013; low lead cast bronze body and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

- C. Backflow Preventer Assemblies shall be listed as approved by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research.

2.06. WATER HAMMER ARRESTORS

A. Manufacturers

1. Jay R. Smith Manufacturing Company - www.jayrsmith.com.
2. Watts Regulator Company, a part of Watts Water Technologies - www.wattsregulator.com.
3. Zurn Industries, LLC - www.zurn.com.
4. Approved Equal.

- B. Water Hammer Arrestors - Copper construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F (-73 to 149 degrees C) and maximum 250 psi (1700 kPa) working pressure.

- C. Install water hammer arrestors as necessary at all Lavatories (LAV-A).

2.07. AIR VENTS

A. Manufacturers

1. ITT Bell and Gossett.
2. Approved Equal.

- B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:

1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

D. Washer Type:

1. Brass with hygroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

2.08. FLOOR DRAIN TRAP SEALS

A. Manufacturers

1. Green Drains.
2. Approved Equal.

B. Description: Push-fit EPDM or silicone fitting with a one-way membrane.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Install floor cleanouts at elevation to accommodate finished floor.
- D. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, and interior and exterior hose bibbs.
- E. Pipe relief from backflow preventer to nearest drain.
- F. Install backflow preventers in accordance with NYS Cross Control requirements.

END OF SECTION

SECTION 15450
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Water Heaters
 - 1. Electric.
- B. Diaphragm-type compression tanks.

1.02. REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.
- B. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.
- C. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Current Edition, Including All Revisions.

1.03. SUBMITTALS

- A. Product Data
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - 4. Provide electrical characteristics and connection requirements.

1.04. QUALITY ASSURANCE

- A. Manufacturer Qualifications - Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Certifications
 - 1. Water Heaters - NSF approved.
 - 2. Electric Water Heaters - UL listed and labeled to UL 174.
 - 3. Products Requiring Electrical Connection - Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01. WATER HEATERS

A. Manufacturers

1. A.O. Smith Water Products Co - www.hotwater.com.
2. Bock Water Heaters, Inc - www.rockwaterheaters.com.
3. Rheem Manufacturing Company - www.rheem.com.
4. Approved Equal.

B. Electric

1. Heater Type – Self-contained, wall mounted unit, water-inlet strainer, removable thermally insulated front panel, and threaded water pipe-end connections.
2. Heater-Heat Exchanger – Stainless steel, thermally insulated and encased assembly in corrosion-resistant steel jacket; baked-on enamel finish.

2.02. DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Construction - Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig (860 kPa), with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- B. Accessories - Pressure gage and air-charging fitting, tank drain; precharge to 12 psig (80 kPa).

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

END OF SECTION

SECTION 15560

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Fastener systems.
2. Equipment supports.

1.02. PERFORMANCE REQUIREMENTS

- ###### A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
1. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.03. ACTION SUBMITTALS

- ###### A. Product Data: For each type of product indicated.
- ###### B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
1. Equipment supports.

1.04. INFORMATIONAL SUBMITTALS

- ###### A. Welding certificates.

1.05. QUALITY ASSURANCE

- ###### A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 PRODUCTS

2.01. METAL PIPE HANGERS AND SUPPORTS

A. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.

2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.02. FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.02. EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.03. MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

3.01. HANGER AND SUPPORT INSTALLATION

- A. Fastener System Installation:
 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
 - a. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
 - b. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

- c. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- d. Install lateral bracing with pipe hangers and supports to prevent swaying.
- e. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

3.02. EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.03. METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.04. ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.05. PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

3.06. HANGER AND SUPPORT SCHEDULE

- A. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.
- B. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
- C. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
 - 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 - 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 - 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 - 6. C-Clamps (MSS Type 23): For structural shapes.
 - 7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 - 8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- D. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
- E. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION

SECTION 15572

VIBRATION CONTROLS FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Elastomeric isolation pads.
 - 2. Elastomeric isolation mounts.
 - 3. Spring hangers.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Delegated-Design Submittal: For each vibration isolation device.
 - 1. Include design calculations for selecting vibration isolators.

1.03 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

PART 2 PRODUCTS

2.01 ELASTOMERIC ISOLATION PADS

- A. Elastomeric Isolation Pads:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Ace Mountings Co., Inc.
 - b. Kinetics Noise Control, Inc.
 - c. Mason Industries, Inc.
 - 2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
 - 3. Size: Factory or field cut to match requirements of supported equipment.
 - 4. Pad Material: Oil and water resistant with elastomeric properties.

5. Surface Pattern: Smooth pattern.
6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads.

2.02 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Ace Mountings Co., Inc.
 - b. Kinetics Noise Control, Inc.
 - c. Mason Industries, Inc.
2. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.03 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Ace Mountings Co., Inc.
 - b. Mason Industries, Inc.
 - c. Vibration Eliminator Co., Inc.
2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
9. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
10. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

PART 3 EXECUTION

3.01 VIBRATION CONTROL DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 03300 "Cast-in-Place Concrete."
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

END OF SECTION

SECTION 15575

IDENTIFICATION FOR HVAC DUCTWORK AND EQUIPMENT

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Duct labels.

1.02. ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 PRODUCTS

2.01. EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Carlton Industries, LP.
 - b. Champion America.
 - c. emedco.
2. Material and Thickness: anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
3. Letter Color: Black.
4. Background Color: White/Bare Metal.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02. WARNING SIGNS AND LABELS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. emedco.
 2. National Marker Company.
 3. Stranco, Inc.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: White.
- D. Background Color: Red.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Label Content: Include caution and warning information plus emergency notification instructions.

2.03. DUCT LABELS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Carlton Industries, LP.
 - 2. emedco.
 - 3. Seton Identification Products; a Brady Corporation company.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Blue – Supply and Green – Exhaust.
- D. Background Color: White.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

PART 3 EXECUTION

3.01. PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02. EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.

- B. Locate equipment labels where accessible and visible.

3.03. DUCT LABEL INSTALLATION

- A. Install plastic-laminated self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 - 1. Blue: For supply ducts.
 - 2. Green: For exhaust ducts.
- B. Locate labels near points where ducts enter into and exit from concealed spaces and in each space where ducts are exposed.

END OF SECTION

SECTION 15731

SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01. SUMMARY

- A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.02. ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.03. INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.04. CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.05. QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.06. WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:
 - a. For Compressor: One year(s) from date of Substantial Completion.
 - b. For Parts: One year(s) from date of Substantial Completion.
 - c. For Labor: One year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Daikin.
 2. Trane.
 3. YORK; a Johnson Controls company.

2.02. AIR HANDLER (5 TONS OR LESS)

- A. Wall-Mounted, Evaporator-Fan Components:
 1. Cabinet: Enameled steel with removable panels on front and ends, and discharge drain pans with drain connection.
 2. Refrigerant Coil:
 - a. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
 - b. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
 - c. The coil shall be a 3 row cross fin copper evaporator coil with 13 fpi design completely factory tested.
 - d. The refrigerant connections shall be flare connections and the condensate will be 1-5/16 inch outside diameter PVC.
 - e. A thermistor will be located on the liquid and gas line.
 3. Fan:
 - a. The fan shall be direct-drive Sirocco type fan, statically and dynamically balanced impeller with high and low fan speeds available.
 - b. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz, with a motor output of 0.51 HP.

- c. The airflow rate shall be available in high and low settings.
 - d. The fan motor shall be thermally protected.
 - e. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.
 - f. Fan motor external static pressure for nominal airflow.
4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
5. Condensate Drain Pans:
- a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
 - 2) Depth: A minimum of 1 inch deep.
 - b. Single-wall, stainless-steel sheet.
 - c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.
 - 1) Minimum Connection Size: NPS1.
 - d. Pan-Top Surface Coating: Asphaltic waterproofing compound.
6. Air Filtration Section:
- a. General Requirements for Air Filtration Section:
 - 1) Comply with NFPA 90A.
 - 2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
 - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
 - b. Disposable Panel Filters:
 - 1) Factory-fabricated, viscous-coated, flat-panel type.
 - 2) Thickness: 1 inch.
 - 3) Arrestance according to ASHRAE 52.1: 80.
 - 4) Merv according to ASHRAE 52.2: 5

- 5) Media: Interlaced glass fibers sprayed with nonflammable adhesive.
- 6) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged: with pull and retaining handles.

2.03. CONDENSER UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant Charge: R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F.
7. Mounting Base: Polyethylene.

2.04. ACCESSORIES

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
- B. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
 1. Compressor time delay.
 2. 24-hour time control of system stop and start.
 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 4. Fan-speed selection including auto setting.

- C. Automatic-reset timer to prevent rapid cycling of compressor.
- D. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- E. Drain Hose: For condensate.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.02. CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.03. FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.

3.04 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION

SECTION 15766

ELECTRIC UNIT HEATERS

PART 1 GENERAL

1.01. SUMMARY

- A. Section includes wall and ceiling heaters with propeller fans and electric-resistance heating coils.

1.02. ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include details of anchorages and attachments to structure and to supported equipment.
 - 4. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
 - 5. Wiring Diagrams: Power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

1.03. CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Chromalox, Inc.

2. INDEECO.
3. QMark; Marley Engineered Products.

2.02 ELECTRIC UNIT HEATERS

A. General:

1. Assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Cabinet:

1. Front Panel: Stamped-steel louver, with removable panels fastened with tamperproof fasteners.
2. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and -tested wall and ceiling heaters before shipping.
3. Surface-Mounted Cabinet Enclosure: 14 gauge epoxy coated Steel with finish to match cabinet.

C. Coil:

1. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high-temperature protection. Provide integral circuit breaker for overcurrent protection.

D. Fan and Motor:

1. Fan: Aluminum constructed epoxy coated propeller directly connected to motor.
2. Motor: Permanently lubricated.

E. Controls:

1. Controls: Unit-mounted thermostat.
2. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install unit heaters in complete accordance with the manufacturer's printed installation instructions and the approved shop drawings.
- B. Install wall and ceiling unit heaters to comply with NFPA 90A.
- C. Install wall and ceiling unit heaters level and plumb.
- D. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.
- E. Ground equipment according to Section 16060 "Grounding and Bonding for Electrical System".
- F. Connect wiring according to Section 16123 "Building Wire and Cable".

END OF SECTION

SECTION 15810
FIXED LOUVERS

PART 1 GENERAL

1.01. SUMMARY

- A. Section includes:
 - 1. Fixed, extruded-aluminum louvers.
 - 2. Fixed, fiberglass louvers

1.02. ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work, Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.

1.03. INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on tests performed according to AMCA 500-L.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
- B. Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

2.02. FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Greenheck Fan Corporation.
 - b. Reliable Products, Inc.
 - c. Ruskin Company.
2. Louver Depth: 4 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Exposed.
5. Louver Performance Ratings:
 - a. Free Area: Not less than 8.0 sq. ft. for 48-inch-wide by 48-inch-high louver.
 - b. Point of Beginning Water Penetration: Not less than 1000 fpm.
 - c. Air Performance: Not more than 0.10-inch wg static pressure drop at 800-fpm free-area exhaust velocity.

B. Louver Screens:

1. Provide screen at each exterior louver.
 - a. Interior face.
 - b. Screening Type: Bird screening.
2. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.
3. Louver Screening:
 - a. Bird Screening: Aluminum, ½-inch-square mesh, 0.063-inch wire.

C. Materials:

1. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
2. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

3. Fasteners: Use types and sizes to suit unit installation conditions.
 - a. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
 - b. For fasteners aluminum, use aluminum or 300 series stainless-steel fasteners.
 - c. For color-finished louvers, use fasteners with heads that match color of louvers.
4. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Fabrication:

1. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowance made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
2. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

E. ALUMINUM FINISHES

1. AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
 - a. Color: As selected by Architect from full range of industry colors and color densities.

2.03 FIXED FIBERGLASS LOUVERS

A. Horizontal, Drainable-Blade Louver:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Hartzall
 - b. Ruskin Company
2. Louver Depth: 4 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Louver Performance Ratings:
 - a. Free Area: Not less than 6.0 sq. ft. for 48-inch-wide by 48-inch-high louver.
 - b. Point of Beginning Water Penetration: Not less than 780 fpm.

- c. Air Performance: Not more than 0.10-inch wg static pressure drop at 800-fpm free-area exhaust velocity.
- 5. Louvers shall comply with ASTM D 4385-8A and be tested and show record for ASTM D 2584-68.
- 6. Material:
 - a. Louver shall be constructed of a flame retardant vinyl ester based substance.
- 7. Screen:
 - a. PVC coated bird screen .5" mesh 19 gauge.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.02 ADJUSTING

- A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION

SECTION 15811

METAL DUCTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Sheet metal materials.
3. Sealants and gaskets.
4. Hangers and supports.

1.02 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ANSI/ASHRAE 62.1.

1.03. ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.

7. Reinforcement and spacing.
8. Seam and joint construction.
9. Equipment installation based on equipment being used on Project.
10. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
11. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.04. INFORMATION SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Items penetrating finished ceiling including the following:
 - a. Luminaires.
 - b. Air outlets and inlets.
 - c. Access panels.
- B. Welding certificates

1.05. QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
 2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 – "Systems and Equipment" and Section 7 – "Construction and Systems Start-up."

- D. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 – “HVAC System Construction and Insulation.”

PART 2 PRODUCTS

2.01. RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's “HVAC Duct Construction Standards - Metal and Flexible” based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's “HVAC Duct Construction Standards - Metal and Flexible,” Figure 2-1, “Rectangular Duct/Transverse Joints,” for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's “HVAC Duct Construction Standards - Metal and Flexible.”
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's “HVAC Duct Construction Standards - Metal and Flexible,” Figure 2-2, “Rectangular Duct/Longitudinal Seams,” for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's “HVAC Duct Construction Standards - Metal and Flexible.”
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's “HVAC Duct Construction Standards - Metal and Flexible,” Chapter 4, “Fittings and Other Construction,” for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's “HVAC Duct Construction Standards - Metal and Flexible.”

2.02. SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's “HVAC Duct Construction Standards - Metal and Flexible” for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the “Duct Schedule” Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the “Duct Schedule” Article. See “Sheet Metal Materials” Article in the Evaluations for discussion on applicable materials and coatings in first four paragraphs below.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce stainless steel ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

- D. Tie Rods: Stainless steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03. SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 3 inches.
 - 3. Sealant: Modified styrene acrylic.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 7. Service: Indoor and outdoor.
 - 8. Service Temperature: Minus 40 to plus 200 deg F.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 - 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.

9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
 2. Type: S.
 3. Grade: NS.
 4. Class: 25.
 5. Use: O.
 6. One or both subparagraphs below may be required to comply with Project requirements or authorities having jurisdiction. Retain first subparagraph below if required for LEED-NC, LEED-CI, or LEED-CS Credit IEQ 4.1.
 7. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 8. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

2.04. HANGERS AND SUPPORTS

- A. Hanger Rods for Corrosive Environments: Stainless steel, all-thread rods.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- C. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. Trapeze and Riser Supports:
 1. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.

PART 3 EXECUTION

3.01. DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.02. DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards – Metal and Flexible."
- B. Seal ducts at minimum to the following seal classes according to SMACNA's "HVAC Duct Construction Standards – Metal and Flexible".
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible."

2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.03. HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, power-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 1. Where practical, install concrete inserts before placing concrete.
 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 5. Do not use power-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.04. CONNECTIONS

- A. Make connection to equipment with flexible connectors complying with Section 15820 “Air Duct Accessories.”
- B. Comply with SMACNA’s “HVAC Duct Construction Standards – Metal and Flexible” for branch, outlet and inlet, and terminal unit connections.

3.05. DUCT CLEANING

- A. Clean new duct systems(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 15820 “Air Duct Accessories” for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Supply-air ducts and turning vanes.

4. Exhaust-air ducts and turning vanes.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Provide drainage and cleanup for wash-down procedures.
6. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.06. START UP

- A. Air Balance: Comply with requirements in Section 15990 "Testing, Adjusting, and Balancing for HVAC."

3.07. DUCT SCHEDULE

A. Exhaust Ducts:

1. Duct Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.

B. Outside-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Duct Connected to Fans:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.

- c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- C. Intermediate Reinforcement:
 - 1. Stainless Steel Ducts: Stainless Steel.
- D. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible, "Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
- E. Velocity 1000 to 1500 fpm:
 - 1. Radius Type 1 with minimum 1.0 radius -to-diameter ration.
 - 2. Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible, "Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- F. Velocity 1500 fpm or Higher:
 - 1. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - 4. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible, " Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible." Figure 4-3, "Vanes and Van Runners," and Figure 4-4, "Vane Support in Elbows."

G. Branch Configuration

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.

END OF SECTION

SECTION 15812
NONMETAL DUCTS

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Fibrous-glass ducts and fittings.

B. Related Sections:

1. Section 15990 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for nonmetal ducts.
2. Section 15812 "Metal Ducts" for single- and double-wall, rectangular and round ducts.
3. Section 15820 "Air Duct Accessories" for dampers, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.02. PERFORMANCE REQUIREMENTS

- A. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.03. ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Duct layout indicating sizes and pressure classes.
3. Elevation of top of ducts.
4. Dimensions of main duct runs from building grid lines.
5. Fittings.
6. Reinforcement and spacing.
7. Seam and joint construction.
8. Penetrations through fire-rated and other partitions.
9. Equipment installation based on equipment being used on Project.

10. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.04. INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Penetrations of smoke barriers and fire-rated construction.
 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Access panels.

1.05. QUALITY ASSURANCE

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
- C. NFPA Compliance:
 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 PRODUCTS

2.01. FIBROUS-GLASS DUCTS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Johns Manville; a Berkshire Hathaway company.

2. Knauf Insulation.
 3. Owens Corning.
- B. Fibrous-Glass Duct Materials: Resin-bonded fiberglass, faced on the outside surface with fire-resistive FSK vapor retarder and with a smooth fiberglass mat finish on the air-side surface.
1. Duct Board: Factory molded into rectangular boards.
 2. Temperature Limits: 40 to 250 deg F inside ducts; 150 deg F ambient temperature surrounding ducts.
 3. Maximum Thermal Conductivity: 0.24 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
 4. Moisture Absorption: Not exceeding 5 percent by weight at 120 deg F and 95 percent relative humidity for 96 hours when tested according to ASTM C 1104/C 1104M.
 5. Permeability: 0.02 perms maximum when tested according to ASTM E 96/E 96M, Procedure A.
 6. Antimicrobial Agent: Compound shall be tested for efficacy by an NRTL, and registered by the EPA for use in HVAC systems.
 7. Noise-Reduction Coefficient: 0.65 minimum when tested according to ASTM C 423, Mounting A.
 8. Required Markings: EI rating, UL label, and other markings required by UL 181 on each full sheet of duct board.
- C. Closure Materials:
1. Pressure-Sensitive Tape: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-P," the manufacturer's name, and a date code.
 - a. Tape: Aluminum foil-scrim tape imprinted with listing information.
 - b. Minimum Tape Width: 2-1/2 inches; 3 inches for duct board thicker than 1 inch.
 - c. Staples: 1/2-inch outward clinching, 2 inches o.c. in tabs, one tab per joint.
 - d. Water resistant.
 - e. Mold and mildew resistant.
 2. Heat-Activated Tape: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-H," the manufacturer's name, and a date code.
 - a. Tape: Aluminum foil-scrim tape imprinted with listing information.
 - b. Minimum Tape Width: 3 inches.

- c. Heat-Sensitive Imprint: Printed indicator on tape to show proper heating during application has been achieved.
 - d. Water resistant.
 - e. Mold and mildew resistant.
- 3. Two-Part Tape Sealing System: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-M," the manufacturer's name, and a date code.
 - a. Tape: Woven glass fiber impregnated with mineral gypsum.
 - b. Minimum Tape Width: 3 inches.
 - c. Sealant: Modified styrene acrylic.
 - d. Water resistant.
 - e. Mold and mildew resistant.
- D. Fabrication:
 - 1. Select joints, seams, transitions, elbows, and branch connections and fabricate according to SMACNA's "Fibrous Glass Duct Construction Standards," Chapter 2, "Specifications and Closure," and Chapter 4, "Fittings and Connections."
 - 2. Fabricate 90-degree mitered elbows to include turning vanes.
 - 3. Reinforcements: Comply with requirements in SMACNA's "Fibrous Glass Duct Construction Standards," Chapter 5, "Reinforcement" for channel- and tie-rod reinforcement materials, spacing, and fabrication.

2.02. HANGERS AND SUPPORTS

- A. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- C. Steel Cables: ASTM A 492, stainless steel with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

PART 3 EXECUTION

3.01. DUCT INSTALLATION

- A. Install ducts with fewest possible joints.
- B. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- C. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- D. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- E. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges. Overlap openings on four sides by at least 1-1/2 inches.
- F. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
- G. Install fibrous-glass ducts and fittings to comply with SMACNA's "Fibrous Glass Duct Construction Standards."

3.02. HANGER AND SUPPORT INSTALLATION

- A. Install hangers and supports for fibrous-glass ducts and fittings to comply with SMACNA's "Fibrous Glass Duct Construction Standards," Chapter 6, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
- C. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.03. DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.

- B. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch duct as recommended by duct manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
 - 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
 - 1. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - 2. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of ducts or duct accessories.
 - 3. Clean fibrous-glass duct with HEPA vacuuming equipment; do not permit duct to get wet. Replace fibrous-glass duct that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.

4. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
5. Provide drainage and cleanup for wash-down procedures.
6. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.04. START UP

- A. Air Balance: Comply with requirements in Section 15990 "Testing, Adjusting, and Balancing for HVAC."

3.05. DUCT SCHEDULE

- A. Indoor Ducts and Fittings:
 1. Fibrous-Glass Rectangular Ducts and Fittings:
 - a. Minimum Flexural Rigidity: EI-475.
 - b. Minimum Board Thickness: 1 inch.

END OF SECTION

SECTION 15820
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Flange connectors.
 - 2. Turning vanes.
 - 3. Duct-mounted access doors.
 - 4. Duct accessory hardware.
 - 5. Differential Pressure Switches

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.03 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For centrifugal fans to include in emergency, operation, and maintenance manuals.

PART 2 PRODUCTS

2.01 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.02 MATERIALS

- A. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 2 finish for exposed ducts.

- B. Reinforcement Shapes and Plates: Compatible materials for stainless-steel ducts.
- C. Tie Rods: Stainless steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 TURNING VALVES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Ductmate Industries, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of stainless sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 - 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- E. Vane Construction: Double wall.

2.04 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Aire Technologies.
 - 2. Ductmate Industries, Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Stainless steel sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.

- e. Fabricate doors airtight and suitable for duct pressure class.
- 2. Frame: Stainless sheet steel, with bend-over tabs and foam gaskets.
- 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches.
 - d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

2.05 DUCT ACCESS PANEL ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Ductmate Industries, Inc.
- B. Labeled according to UL 1978 by an NRTL.
- C. Panel and Frame: Minimum thickness 0.0428-inch stainless steel.
- D. Fasteners: Stainless steel. Panel fasteners shall not penetrate duct wall.
- E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.
- F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.06 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Ductmate Industries, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..

2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd..
 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 3. Service Temperature: Minus 50 to plus 250 deg F.

2.07 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Stainless steel to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

2.08 DIFFERENTIAL PRESSURE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Dwyer, Michigan City, IN
 2. Neobits, Santa Clara, CA
 3. Or approved equal.
- B. Vertical Plane Mounting
- C. NEMA 7 Enclosure rating appropriate for Class 1 Div 1 environments.
- D. Pressure range of each differential pressure switch shall be selected to match the corresponding duct system.
- E. Pressure set point shall be field adjustable.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

- B. Install duct accessories of materials suited to duct materials; use stainless-steel accessories in stainless-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install test holes at fan inlets and outlets and elsewhere as indicated.
- D. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. At outdoor-air intakes and mixed-air plenums.
 - 2. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 3. At each change in direction and at maximum 50-foot spacing.
 - 4. Upstream from turning vanes.
 - 5. Control devices requiring inspection.
 - 6. Elsewhere as indicated.
- E. Install access doors with swing against duct static pressure.
- F. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body plus Ladder Access: 25 by 17 inches.
- G. Label access doors according to Section 15075 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- H. Install flexible connectors to connect ducts to equipment.
- I. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- J. Install duct test holes where required for testing and balancing purposes.
- K. Differential Pressure Switches
 - 1. To be installed in all ductwork serving classified spaces after the fan and before any air terminals. Units shall be calibrated to detect airflow and to send a signal when air flow is not detected. Coordinate with Instrumentation and Controls.

3.02 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Inspect locations of access doors and verify that purpose of access door can be performed.
2. Inspect turning vanes for proper and secure installation.

END OF SECTION

SECTION 15831
CENTRIFUGAL HVAC FANS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: For each product.

1. Aluminum Centrifugal Inline fans.
2. Fiber-reinforced polymer Centrifugal Inline fans.
3. Square Inline Fan

1.02 ACTION SUBMITTALS

A. Product Data:

1. Include rated capacities, furnished specialties, and accessories for each fan.
2. Certified fan performance curves with system operating conditions indicated.
3. Certified fan sound-power ratings.
4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
5. Material thickness and finishes, including color charts.
6. Dampers, including housings, linkages, and operators.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

1.03 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.
- B. Field quality-control reports.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For centrifugal fans to include in emergency, operation, and maintenance manuals.

1.05 MAINTENANCE MATERIAL SUBMITTALS

- A. Belts: One set(s) for each belt-driven unit.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Fans shall be fully assembled and mounted on the skid at the factory. Equipment shall be crated and delivered to protect against damage during shipping. Flange faces shall be protected from damage. All openings shall be covered to prevent entrance of dirt, water and debris.
- B. Properly protect all parts so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and until the units and equipment are ready for operation.
- C. Properly protect finished iron or steel surfaces to prevent rust and corrosion.
- D. Acceptance at Site: Equipment arriving at the site in a damaged condition shall be rejected.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. AMCA Compliance: Comply with AMCA performance requirements and bear the AMCA-Certified Ratings Seal.

2.02 ALUMINUM CENTRIFUGAL INLINE FANS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. HARTZELL
 - 2. Greenheck.
 - 3. Aerovent; a division of Twin City Fan Companies, Ltd.

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Housings:

1. Heavy gauge commercial quality aluminum suitable for temperatures up to 180 ° F.
2. Formed panels to make curved-scroll housings with shaped cutoff.
3. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
4. Spun inlet cone with flange.
5. Outlet flange.

D. Wheels:

1. Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades, and fastened to shaft with set screws.

E. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Grease-Lubricated Shaft Bearings:

1. Minimum L 10 life of 50,000 hours
2. Heavy-duty, self aligning ball or roller type and relubricated for continuous service.
3. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.

G. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.5.
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

H. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. All fan hardware shall be stainless steel.
3. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
4. Companion Flanges: Rolled flanges for duct connections of same material as housing.
5. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
6. Discharge Dampers: Assembly with parallel blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
7. Inlet Screens: Grid screen of same material as housing.
8. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
9. Spark-Resistant Construction: AMCA 99.
10. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.

11. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

2.03 FIBER-REINFORCED POLYMER CENTRIFUGAL INLINE FANS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. HARTZELL
 2. Greenheck.
 3. Aerovent; a division of Twin City Fan Companies, Ltd.
- B. Description:
 1. Fans shall be constructed in accordance with ASTM D4167.
 2. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
 3. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
 4. Factory-installed and -wired disconnect switch.
- C. Housings:
 1. Fiber-reinforced polymer conforming with ASTM C852
 2. Formed panels to make curved-scroll housings with shaped cutoff.
 3. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
 4. Spun inlet cone with flange.
 5. Outlet flange.
- D. Fan Wheel:
 1. Fan wheel shall be constructed of Fiber-reinforced polymer, one piece, with a totally encapsulated aluminum core insert for secure attachment to shaft.
- E. Shaft:
 1. Shaft shall be constructed of Type 316 Stainless steel. Provide a Teflon seal between the shaft and fan housing.

2. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
3. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.

E. Fan Motor:

1. Fan motors shall meet or exceed EISA efficiencies. Motors to be NEMA T-frame, and explosion proof.
2. Drive belts and sheaves shall be sized for 150% of the fan operating brake horsepower, and shall be readily and easily accessible for service, if required.
3. Movable motor plate with adjustment screws to make belt tensioning operations.
4. Fan shaft to be turned and polished steel that is sized so the first critical speed is at least 25% over the maximum operating speed for each pressure class.
5. Fan shaft bearings shall be Air Handling Quality, bearings shall be heavy-duty grease lubricated, self-aligning or roller pillow block type.
6. Air Handling Quality bearings to be designed with low swivel torque to allow the outer race of the bearing to pivot or swivel within the cast pillow block. Bearings shall be 100% tested for noise and vibration by the manufacturer. Bearings shall be 100% tested to ensure the inner race diameter is within tolerance to prevent vibration.
7. Bearings shall be selected for a basic rating fatigue life (L-10) of 100,000 hours at maximum operating speed for each pressure class.

F. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. All fan hardware shall be stainless steel.
3. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
4. Companion Flanges: Rolled flanges for duct connections of same material as housing.
5. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
6. Discharge Dampers: Assembly with parallel blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
7. Inlet Screens: Grid screen of same material as housing.

2.04 SQUARE INLINE FANS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. HARTZELL
 - 2. Greenheck.
 - 3. Aerovent; a division of Twin City Fan Companies, Ltd.
- B. Description:
 - 1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
 - 2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
 - 3. Factory-installed and -wired disconnect switch.
- C. Wheel:
 - 1. Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades, and fastened to shaft with set screws.
- D. Motor:
 - 1. Motor enclosures: Explosion Proof
 - 2. Motors are heavy duty ball bearing type to match with the fan load and furnished at the specific voltage and phase.
 - 3. Mounted on vibration isolators, out of the airstream.
 - 4. For motor cooling there shall be fresh air drawn into the motor compartment through an area free of discharge contaminants.
 - 5. Accessible for maintenance.
- E. Shafts and Bearings:
 - 1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
 - 2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.

3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
4. Grease-lubricated shaft bearings minimum L 10 life of 100,000 hours, heavy-duty, self aligning ball or roller type and relubricated for continuous service.

F. Housing:

1. Aluminum construction
2. Formed panels to make curved-scroll housings with shaped cutoff.
3. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
4. Split housings in first subparagraph below are an optional configuration.
5. Spun inlet cone with flange.
6. Outlet flange.

G. Drive Assembly:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.5.
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

H. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. All fan hardware shall be stainless steel.

3. Companion Flanges: Rolled flanges for duct connections of same material as housing.

2.05 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install centrifugal fans level and plumb.
- B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.
- D. Equipment Mounting:
 1. Comply with requirements for vibration isolation devices specified in Section 15072 "Vibration Controls for HVAC."
- E. Unit Support: Install centrifugal fans level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure units to structural support with anchor bolts.
- F. Install units with clearances for service and maintenance.
- G. Label fans according to requirements specified in Section 15075 "Identification for HVAC Piping and Equipment."

3.02 CONNECTIONS

- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 15820 "Air Duct Accessories."
- B. Install ducts adjacent to fans to allow service and maintenance.
- C. Install piping from scroll drain connection, with trap with seal equal to 1.5 times specified static pressure, to nearest floor drain with pipe sizes matching the drain connection.

3.03 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 3. Verify that cleaning and adjusting are complete.
 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 5. Adjust belt tension.
 6. Adjust damper linkages for proper damper operation.
 7. Verify lubrication for bearings and other moving parts.
 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 9. See Section 15990 "Testing, Adjusting, and Balancing For HVAC" for testing, adjusting, and balancing procedures.
 10. Remove and replace malfunctioning units and retest as specified above.
- B. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION

SECTION 15852
REGISTERS AND GRILLES

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes:

1. Fixed face grilles.

B. Related Requirements:

1. Section 15820 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.

1.02. ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 PRODUCTS

2.02. GRILLES

A. Fixed Face Grille :

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. A-J Manufacturing Co., Inc.
 - b. Price Industries.
 - c. Titus.
2. Material: Stainless Steel.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal.
5. Face Arrangement: Perforated core.
6. Core Construction: Removable.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install registers and grilles level and plumb.
- B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.02. ADJUSTING

- A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 15990

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.

1.02 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- F. TDH: Total dynamic head.

1.03 INFORMATIONAL SUBMITTALS

- A. Strategies and Procedures Plan: Within 90 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- B. Certified TAB reports.

1.04 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC NEBB or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC NEBB or TABB.
 - 2. TAB Technician: Employee of the TAB specialist and certified by AABC NEBB or TABB as a TAB technician.
- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- I. Examine operating safety interlocks and controls on HVAC equipment.

- J. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures for balancing the systems.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 - 1. Airside:
 - a. Duct systems are complete with terminals installed.
 - b. Fans are operating, free of vibration, and rotating in correct direction.
 - c. Windows and doors are installed.
 - d. Suitable access to balancing devices and equipment is provided.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 15820 "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 15081 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check for airflow blockages.
- H. Verify that air duct system is sealed as specified in Section 1 "Metal Ducts."

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
 - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
 - d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
 - 2. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.

- d. Report artificial loading of filters at the time static pressures are measured.
 3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 4. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust air inlets and outlets for each space to indicated airflows.
1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
 2. Measure inlets and outlets airflow.
 3. Adjust each inlet and outlet for specified airflow.
 4. Re-measure each inlet and outlet after they have been adjusted.

3.06 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
1. Supply and Exhaust Fans and Equipment with Fans: Plus 15 percent – not less than designed.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.07 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.

15. Test conditions for fans performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
 1. Quantities of supply and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
- E. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave and amount of adjustments in inches.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.

- c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- F. Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
- 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.

G. Air-Terminal-Device Reports:

1. Unit Data:

- a. System and air-handling unit identification.
- b. Location and zone.
- c. Apparatus used for test.
- d. Area served.
- e. Make.
- f. Number from system diagram.
- g. Type and model number.
- h. Size.
- i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm.
- b. Air velocity in fpm.
- c. Preliminary airflow rate as needed in cfm.
- d. Preliminary velocity as needed in fpm.
- e. Final airflow rate in cfm.
- f. Final velocity in fpm.
- g. Space temperature in deg F.

A. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.08 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Owner.
- B. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- E. If TAB work fails, proceed as follows:
 - 1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - 2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
 - 3. If the second verification also fails, design professional may contact AABC Headquarters regarding the AABC National Performance Guaranty.
- F. Prepare test and inspection reports.

3.09 ADDITIONAL TESTS

- 1. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- 2. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 16055

ELECTRICAL WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. General work description and requirements for electrical work included in this contract.
- B. Raceways, fittings and boxes.
- C. Conductors and accessories.
- D. Wiring devices.
- E. Grounding.
- F. Panelboards.
- G. Disconnect and safety switches.
- H. Nameplates and labels.
- I. Spare devices.

1.02. GENERAL REQUIREMENTS

- A. All work shall be subject to applicable sections of these specifications, not necessarily the aforementioned related sections.
- B. Examination of Premises
 - 1. Before submitting a proposal, the Contractor shall examine all drawings and specifications relating to work of all trades to determine scope and relation to other work.
 - 2. Ascertain access to site, available storage, and delivery facilities.
 - 3. Before commencing work, verify all governing dimensions and examine all adjacent work at site and/or buildings.
 - 4. Some equipment or material items may be special order items having long order times and shall be ordered well in advance of installation. Unavailability due to long lead times or special orders is not an excuse for not providing the specified items.

1.03. SCOPE OF WORK

- A. The principal items of electrical work include, but are not necessarily limited to, the following:

1. Provide all electrical power, lighting, control, instrumentation, ductbanks, communications systems, including exposed and concealed raceway systems, conductors, cables, fittings, special control, wiring devices, distribution equipment, starters, variable frequency drives (VFDs), overcurrent protection, terminations, connections, and interconnections, and all related appurtenances to provide a complete and operating electrical system.
2. Provide all system and equipment grounding in conformance with the requirements of these specifications and the National Electrical Code (NEC).
3. Provide electrical labels, signs, and nameplates per this section.
4. Install all electrical equipment, conduit, wire, conductors, cable, connections, etc., required for complete and operating systems.
5. Coordinate work with the work of others for timely completion of the work of this Contract.
6. Repair, fill and/or patch surfaces of all building components including walls, floors, ceilings, and roofs damaged or left open or bare as a result of the electrical work.
7. Have New York Board of Fire Underwriters or other Owner-approved third-party inspecting agency inspect electrical installation. Submit a final certificate approving all work to the Engineer prior to final acceptance of the electrical work.
8. See Section 01700, Contract Closeout, for additional requirements for record drawings, operation and maintenance manual, final testing and inspection, and guarantees and warranties.
9. Provide all materials, equipment, and labor required for complete and operating electrical power and instrumentation systems.
10. Perform all trenching, backfilling, compaction, restoration of surfaces, dewatering (as required), ductbank fabrication, and pole installation required for grounding system, electric services and distribution, and instrumentation.

1.04. CODES AND STANDARDS

- A. Reference to various codes and standards are a minimum installation requirements standard. In case(s) of discrepancy between the Contract Documents and the NEC, the stricter requirement shall apply.
- B. All work, equipment, and materials furnished shall conform with the existing rules, requirements, and specifications of the Insurance Rating Organization having jurisdiction; the NEC; the National Electric Manufacturer's Association (NEMA); the Underwriters Laboratories (U.L.); and the respective utilities.
- C. All material and equipment shall bear the inspection labels of U.L. unless otherwise allowed by the Engineer in writing and if the material and equipment is of the class inspected by said laboratories. All labeling shall be for the intended usage.

- D. The Contractor shall be held responsible for adherence to all rules, requirements, and specifications as set forth above. Any additional work or material necessary for adherence will not be allowed as an extra but shall be included in the bid price. Ignorance of any rule, requirement, or specification shall not be allowed as an excuse for non-conformity. Acceptance by the Owner or Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist on the Drawings submitted or in the satisfactory operation of any equipment.

1.05. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300, Submittals.
- B. The Engineer's approval shall be obtained for all equipment and material for which shop drawings are required before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. Provide submittals for all conduit, wire, cable, boxes other than device boxes, enclosures, fittings, hangers, supports, outlets, disconnect switches, lighting fixtures, ballasts, starters, overloads, overcurrent devices, panelboards, control and starter panels, sealoffs, and all other electrical equipment as listed in other sections.
- D. Provide submittals for all Divisions 16 and 17 work shown.
- E. Provide submittals for all interior and exterior conduit layout. Submittals shall be 11-inch x 17-inch or 24-inch x 36-inch scaled drawings indicating conduit routing, elevations, quantity and type of conduits, quantity and type of wires, and conduit source and destination. All pull and junction boxes shall also be noted on the Drawings.
- F. CONDUIT LAYOUT SUBMITTAL - Provide submittals for all interior and exterior conduit layout. Submittals shall be 11-inch x 17-inch or 24-inch x 36-inch scaled drawings indicating conduit routing, elevations, quantity and type of conduits, quantity and type of wires, and conduit source and destination. All pull and junction boxes shall also be noted on the drawings. Conduits shall be tagged/labeled on the drawings and likewise labeled during installation.

1.06. RECORD DRAWINGS

- A. In addition to the requirements of Section 01700, Contract Closeout, regarding record drawings, prepare and submit marked-up field record drawings, which shall include all addenda items and changes made during construction, to the Engineer prior to final acceptance. Additionally, submit record drawings consisting of the following three types of drawings:
 - 1. Elementary or Schematic Diagrams - All control schematics and elementary diagrams. Those constructed as shown on Contract Drawings need only be verified on the marked-up field set. For those that changed, submit preliminary revised schematic and elementary diagrams for the Engineer's review. Once reviewed and approved, these diagrams shall be drafted on 24-inch by 30-inch sheets and added as "___A" sheets.

2. Block Diagrams - Prepare and submit fully labeled block diagrams, showing all point-to-point connections giving conduit size and fill (each conductor number, size, and color listed) showing all junction boxes, pullboxes, panels, etc., together with terminal numbers at all conductor terminations. Initially, hand sketches on 8-1/2-inch by 11-inch sheets can be submitted for review. Once reviewed and approved, these designs shall be drafted on 24-inch by 36-inch sheets with suitable title block data. Block diagrams are to be updated to reflect all final connections (connections labeled) or other changes. When there is more than one sheet of block diagrams, an index shall be included to indicate on which sheet the respective pieces of equipment can be found.
 3. Contractor's As-built Drawings - Provide one 24-inch by 36-inch copies of electrical as-built drawings of the Contract Drawings with all field notes and comments to illustrate actual construction conditions. As-built drawings shall include all addenda items issued during bidding and all other changes to the documents that occurred during construction. Drawing to be titled "Contractor's As-built Drawing, Prepared by: (name of Contactor) , Date Issued: _____."
 4. Electronic copies of the as-bid set of Contract Drawings will be provided to the Contractor for use in record drawing preparation. Contractor shall modify the as-bid set of drawings for record drawings. All drawings shall be prepared using AutoCAD drafting; no paste-on information will be allowed.
- B. Submit a final record drawing copy on 24-inch by 36-inch vellum for the Engineer's review.
- C. "A" drawings shall be prepared (24-inch by 36-inch) showing all concealed conduit including ductbanks that cannot be shown clearly on the marked-up field set. All underground conduit routings and ductbanks shall be dimensioned from aboveground structures. All manholes, handholes, pullboxes, and bends without structures shall have at least two ties.
- D. Once final approval of the drawings with corrections is provided to the Contractor, all final drawings shall be provided on a compact disc and produced using the computer-aided drafting system, AutoCAD 2018, as a minimum. Later revisions shall be saved as this version.

1.07. EQUIPMENT PROTECTION

- A. Equipment and material shall be delivered to the site in new, unused condition in original packaging. Contractor shall be responsible to store equipment and protect against damage, theft, dirt, moisture and temperature extremes.
- B. All switchboards, programmable logic controllers, VFDs, and instrumentation to be transported under this contract shall be shipped to and from the site in enclosed, weathertight, sealed containers in a manner designed to protect the units against damaging stress caused by sudden acceleration or deceleration. An indicating meter, such as "Drop-N-Tell," designed to indicate any sudden impacts that exceed the unit's rating shall be shipped with and fixed to each assembly or its packing crate. Upon arrival of each shipment at the project site, the meter shall be examined in the presence of representatives of the Engineer, the Contractor, and the equipment manufacturer. If the acceleration indicates the

package exceeded the limits of the meter, the assembly or subassembly shall be dismantled and completely inspected. All damage shall be corrected before the equipment is incorporated into the work. The Contractor shall bear all cost arising out of dismantling, inspection, repair, and reassembly, including engineering costs. The meters shall be sized for three times the weight of the packaged item.

- C. During the installation of equipment, controls, controllers, circuit protective devices, etc., these items shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operation.
- D. Damaged equipment, as determined by the Owner and/or the Engineer, shall either be repaired to new condition or replaced with new equipment.
- E. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or similar protective cover.

1.08. EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. The locations of equipment, fixtures, outlets and similar devices shown on the Contract Drawings are approximate only.
 - 1. Equipment shall be installed as close as practical to locations shown on the Drawings. Where Contractor supplied equipment sizes differ from that anticipated on the Drawings, the Contractor shall prepare and submit to the Engineer new "to scale" layouts showing new equipment locations for approval.
- B. Equipment Provided Under Other Divisions
 - 1. Reasonable effort has been made to show the actual locations and sizes of the equipment to be provided under other sections of the specifications and installed by other trades for the project. These locations shall be considered approximate, but suitable for preparation of the Contractor's bid. These locations are not necessarily final locations. Contractor shall verify equipment size and location with the installing trades before rough in and obtain the applicable shop drawing information to enable the electrical trade(s) to furnish and install electrical service to the equipment.
 - 2. The Contractor and/or the electrical installer(s) shall coordinate the exact locations of all equipment, receptacles, box-outs, sleeves and similar items required for the completion of electrical work with the structural, architectural, mechanical or other work.
 - 3. The wiring configuration of equipment provided by other divisions will vary, depending on the manufacturer used. Specific wire connections to equipment provided by other divisions are not shown in these documents. The electrical installer(s) shall coordinate the wire connections with the division supplying the equipment.
 - 4. No additional compensation will be made for relocations, reconnections or additional work required as a result of the failure of the Contractor and/or the electrical installer(s) to fully coordinate the work of all trades.

C. Inaccessible Equipment

1. Where the Engineer determines that the Contractor or his subcontractors has installed equipment that is not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as required by the Engineer at the Contractor's expense.
2. "Conveniently accessible" is defined as reachable without the use of ladders, without climbing over or crawling under obstacles such as equipment, structures, piping and ductwork. Equipment shall be installed at the heights as specified in other sections of these specifications, except any readout devices shall be installed so that the centerline of the readout is 5 feet 0 inches above finish floor.

D. Equipment and Material - Equipment and material shall be designed to assure satisfactory operation and operating life for environmental conditions where being installed. These specifications, the NEC and other code requirements shall apply to the installation in areas requiring special protection; i.e., hazardous, wet or corrosive area/location, and weatherproof construction.

E. Classified Areas

1. General - Enclosures for classified areas shall be as specified in Section 16161, Control Panels and Enclosures.
2. Hazardous Areas
 - a. In the areas designated as Hazardous and where explosionproof work is shown or specified, all work shall meet the requirements of the NEC for the classification of that location.
 - b. Equipment enclosures shall be approved for use in the atmosphere of the area in which they are installed, i.e., Class I, Division 1, Group D; Class I, Division 2, Group D atmospheres.
3. Wet Locations - Where installed outdoors or in areas designated as wet locations, all work shall meet the requirements of these Specifications and of the NEC for wet locations.
4. Corrosive Areas - All equipment shall be corrosion resistant in areas so designated unless specified otherwise.

F. Rigging and Moving Equipment - Contractor and his subcontractors shall exercise extreme care and caution in moving and installing equipment. Skilled riggers shall be employed to move any equipment over 300 lbs. or of sufficient bulk. Proper falsework, skids, blocking, runways, supports of new or existing work, or other devices shall be employed when moving or placing equipment.

G. Diagrammatic Drawings

1. Circuit diagrams and plans shown are diagrammatic and functional only and are not intended to show exact circuit or wiring layouts, number of fittings or other installation details. The Contractor shall furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
2. Circuits beyond their pushbutton and control device and conduits containing lighting circuits beyond panelboards are not always shown or scheduled.
3. The number of conductors shown is not necessarily the correct number required. Contractor shall install as many conductors as are required for the complete and satisfactory operation of all systems.

- H. Conductor Sizing - Conductor sizes are shown for equipment branch circuits extending less than 100 feet from power source. Refer to schedule in this section for sizing conductors on circuits more than 100 feet long. Conduit sizes shall change accordingly.

PART 2 MATERIALS AND EXECUTION

2.01. RACEWAYS, FITTINGS AND BOXES

A. Raceways

1. Type D - Rigid Non-metallic Conduit Schedule 40 (Polyvinyl Chloride [PVC] or High-Density Polyethylene [HDPE])
 - a. PVC conduit shall be used in ductbanks, HDPE conduit shall be used for utility service entrance ductbanks. This type of conduit shall be not used for stub-ups from ductbanks. Stub-ups shall be Type E.
 - b. Description - Rigid, non-metallic conduit, shall be rigid PVC or HDPE, Schedule 40 and shall conform to Federal Specifications W-C-1094 and Underwriters Laboratories, Inc. Standard UL-651.
 - c. Manufacturers
 - 1) Pittsburgh Standard (RobRoy Industries).
 - 2) Allied.
 - 3) Carlon
 - 4) Or approved equal.
2. Type E – PVC-Coated Rigid Steel Conduit with an Interior Urethane Coating
 - a. Unless otherwise indicated on the Contract Drawings or under this section, all wiring shall be run in Type E conduit.

- b. Description – PVC-coated, rigid steel conduit. Shall conform to Federal Specification WWC-581d and be coated with a heat polymerizing adhesive prior to plastic coating. PVC coating shall be applied by plastisol method. The interior coating shall be a factory-applied two-part 2 mil thick chemically cured hot dipped urethane coating. The conduit shall conform to NEMA Standard No. RNI-1986.
- c. Manufacturers
 - 1) Pittsburgh Standard (RobRoy Industries).
 - 2) OCAL.
 - 3) Or approved equal.

3. Type G - Liquid-tight Flexible Conduit

- a. Application - For use in wet areas as final connection to heating and ventilating equipment, motors, and other vibrating equipment.
- b. Description - Liquid-tight, flexible conduit shall be flexible galvanized steel case with extruded PVC jacket.
- c. Manufacturers
 - 1) Pittsburgh Standard (RobRoy Industries).
 - 2) Anonconda.
 - 3) Triangle.
 - 4) Keystone.
 - 5) O.Z. Gedney.

4. Type H - Explosionproof, Flexible Conduit

- a. Application - For use in hazardous areas as final connection to lighting, heating and ventilating equipment, motors, and other vibrating equipment.
- b. Description - Explosionproof, flexible conduit shall be flexible core with bronze braid covering and steel end fittings.
- c. Manufacturers
 - 1) Crouse-Hinds.
 - 2) Appleton.
 - 3) Killark.
 - 4) Or approved equal.

B. Conduit Fittings

- 1. All Fittings – Cast-type material and coatings shall match conduit system it is to be used with.
- 2. Covers shall be of the same material as the fittings to which they are attached. Provide gaskets for exterior use and for interior wet areas.

C. Expansion Deflection Fittings

1. Material shall match conduit system it is to be used with, designed for 4-inch movement.
2. Coupling shall compensate for the following movements:
 - a. Axial expansion or contraction.
 - b. Angular misalignment.
 - c. Parallel misalignment.

D. Access Fitting and Pulling Fitting - Of the same construction as conduit fittings. Provide cover gasket for interior wet locations and exterior areas. For corrosive areas, use PVC or fiberglass boxes.

E. Boxes

1. Outlet and Device - Of the same construction as conduit fittings. Provide cover gasket in wet locations.
2. Junction and Pullboxes - Of the same construction as conduit fittings. Up to 100 cubic inches. Larger interior non-classified area boxes shall be galvanized with hinged covers. Exterior and interior wet, non-corrosive areas shall be stainless steel. Provide cover gasket in wet or corrosive locations. Provide terminal strips for joining conductors in boxes over 100 cubic inches.

F. Elbows - Factory made by same manufacturer as couplings or conduit. Material to match conduit system it is to be used with.

G. Miscellaneous

1. Nipples, Locknuts, and Bushings - Factory made; material to match conduit system it is to be used with.

H. Conduit and Core Hole Sealing - Mechanical link type with elastomeric links joined by stainless steel bolts which also serve to expand the seal. Manufacturer - GPT Industries, Model "Linkseal." Shall be fire rated when used in fire walls.

2.02. CONDUCTORS AND ACCESSORIES

A. Conductors - Application, Material, Manufacturers

1. Multi-Conductor Power and Control Cable
 - a. Application - For use in place of building wire and cable when powering three-phase equipment or for consolidating the number of power and control cables between two locations.

- b. Description - Multi-conductor, Type TC cable.
 - 1) Conductor - Stranded copper.
 - 2) Insulation Voltage Rating - 600 volts.
 - 3) Insulation Material - PVC with phase indicators for individual conductors and nylon or PVC for overall jacket.
 - c. Manufacturers
 - 1) Anixter - Model 3G.
 - 2) Cablec - Model AP14321.
 - 3) Belden – Tray cable.
 - 4) Or approved equal.
2. Building Wire and Cable
- a. Application - For general use for all conductor applications unless specifically called out otherwise. Not for use as instrumentation cable or in manufactured control panels, service entrance cable, power distribution cable, and submersible cable.
 - b. Description - Single conductor insulated wire type as indicated below.
 - 1) Conductor - Stranded copper only.
 - 2) Insulation Voltage Rating - 600 volts.
 - 3) Insulation Type - Type THHW/THWN for feeders and branch circuits.
 - 4) Insulation Type – Type USE/RHW for underground service entrance feeders.
 - 5) Insulation Material - PVC or thermoplastic with nylon overall jacket.
 - c. Manufacturers
 - 1) Triangle PWC, Inc. – Model TP-220TH, TP-230TN.
 - 2) Anixter - Model 6G.
 - 3) Okonite - Model 116-67.
 - 4) Or approved equal.
3. Twisted Instrumentation Cable (Interior)
- a. Application - For signal or instrumentation wiring and use where called for on Contract Drawings.
 - b. Description - Single or multi, twisted pair and twisted triad cable with overall shield.
 - 1) Conductor - Stranded copper, Size 16 AWG.
 - 2) Insulation Voltage Rating - 600 volts.
 - 3) Insulation Material - Color coded PVC for individual conductors and nylon or overall jacket.
 - 4) Shielding – 100 percent overall aluminum or aluminum/polyester foil.
 - 5) Drain - Tinned copper wire.

- c. Manufacturers
 - 1) Alpha - Model 2471 (2421).
 - 2) Belden - Model 8719 (8760).
 - 3) Or approved equal.
- 4. Twisted Instrumentation Cable (Exterior And Ductbanks)
 - a. Description - Single and multi-twisted pair cable with overall shield.
 - b. Conductor - Stranded copper, size 16 AWG.
 - c. Insulation Voltage Rating - 600 volts.
 - d. Insulation - PVC.
 - e. Shielding, Single Pair - Aluminum/polyester tape.
 - f. Drain - Tinned copper drain wire.
 - g. Overall Jacket - Nylon.
 - h. Manufacturers
 - 1) Okonite Company - Type P-OS, Model 264.
 - 2) Belden Model 9342.
 - 3) General Cable BICC, No. 125986.
 - 4) Or approved equal.
- 5. Telecommunication Cable (for Interior Use)
 - a. Application - For use where called for on Contract Drawings.
 - b. Description - Multi-conductor cable, insulated and twisted into pairs.
 - 1) Conductor - Solid copper, minimum Size 24.
 - 2) Insulation Material - Color coded PVC for individual conductors and PVC for overall jacket.
 - 3) Rip Cord - If available.
 - 4) Outer Jacket - PVC.
 - c. Manufacturers
 - 1) Anixter - Inside wiring, Model CAT 3 Type CMR.
 - 2) Belden – CAT 3, Model 1232A1.
 - 3) General Cable – CAT 3 UTP Type CMR.
 - 4) Or approved equal.

6. Telecommunication Cable for Underground Ductbank Installations
 - a. Description - Multi-conductor cable. Insulated conductor is twisted into pairs for installation in ductbanks.
 - b. Conductor - Minimum size No. 24 solid, annealed, bare copper.
 - c. Insulation - Color coded, polyethylene or polypropylene.
 - d. Units - Pairs stranded into units.
 - e. Cover - Wire bundle covered with non-hyrosopic tape.
 - f. Sheath - Aluminum shield.
 - g. Jacket - Polyethylene; marked at foot intervals.
 - h. Manufacturers
 - 1) Anixter – Type RUS/REA PE-89.
 - 2) General Cable – Type RUS (REA) P-89AL.
 - 3) Or approved equal.
7. Submersible Motor Conductors
 - a. Description - Submersible, non-hazardous, extra heavy usage.
 - b. Conductor - Stranded copper.
 - c. Insulation Voltage Rating - 600 volts.
 - d. Insulation - EPD and CP or EP (ethylene propylene) with phase indicators.
 - e. Manufacturers
 - 1) Anixter - Model 4 PC.
 - 2) Okonite.
 - 3) Cable supplied with and as part of the manufacturer's standard product offering.
 - 4) Or approved equal.
8. Bonding and Grounding Conductors
 - a. Application - For use as needed to meet the requirements of this specification as shown on the Drawings and the NEC for bonding and grounding.
 - b. Description - Multi-conductor cable, insulated conductor is twisted into pairs.
 - 1) Conductor - Bare copper wire.
 - 2) Stranding - Solid ASTM B-1 for Sizes No. 8 and smaller. Stranded ASTM B-8 for Sizes No. 6 and larger.

- 3) Grounding system conductor from inside equipment to grounding rods or plates and under ductbanks shall be tin-plated. Note: This is a special item; order well in advance of installation.

c. Manufacturers

- 1) Anixter - Model 1A or 1B.
- 2) Cablec - Molded "bare and coated copper conductors" listed under Section 7, "Special Purpose Cables."
- 3) Or approved equal.

9. Control Panel Wire

- a. Application - For use in all manufactured or custom-built control panels.

- b. Description - 90 degrees C machine tool wire.

- 1) Conductor - Minimum Size AWG #16, 19 strand.
- 2) Insulation - PVC, 2/64-inch for 600 V service.

c. Manufacturers

- 1) Carol - Catalog Series 7600.
- 2) Anixter - Catalog Series 6W.
- 3) Or approved equal.

B. Wire Terminations and Connectors

1. General

- a. Connector material shall be compatible with the wire that it is to be used with.
- b. Connectors made of aluminum shall not be used with copper conductors.
- c. Connectors listed below are for use with copper wire. Connectors to be used with aluminum wire shall be of the same general type and construction as those listed below but shall be suitable for use with aluminum conductors.

2. Terminal Block Manufacture

a. Control Wiring

- 1) Buchanan - Model 0241.
- 2) Connectron - Model NSS3.
- 3) Or approved equal.

b. Equipment Power Wiring

- 1) Buchanan - Model 416.
- 2) Connectron - Model NC3.
- 3) Or approved equal.

3. Two-Way Splices
 - a. Description - Tubular compression type for conductors 1/0 and larger. Rated 600 VAC and uninsulated.
 - b. Manufacturer
 - 1) Burndy - Model YS-L "Hylink."
 - 2) Thomas & Betts - Model 545.
 - 3) 3M Model 10000.
 - 4) Or approved equal.
4. Crimp Connectors
 - a. Description - For branch circuit connections, other than lighting and receptacle circuits.
 - b. Manufacturer
 - 1) Ideal - Series 30; Model 410, 411, 412 with Model 415 and 417 insulator.
 - 2) Thomas & Betts - Model PT66M,
 - 3) Or approved equal.
5. Bus or Lug Terminals, Manufacturer - 600 VAC, Crimp Type
 - a. Burndy - "HYLUG" Catalog, Series YA.
 - b. Ideal - Catalog Series CCL and CC.
 - c. Or approved equal.
6. Terminal Strip Connectors
 - a. Description - For control and instrumentation connections to terminal strips. Locking fork, vinyl, self-insulated, crimp-type connectors or tubular clamp type.
 - b. Manufacturers
 - 1) Burndy - "VINYLUG" Types TP-LF and BA-EL.
 - 2) Thomas & Betts - Catalog Series 18RA, 14RB, and 10RC.
 - 3) Ideal - Series 83-7.
 - 4) Or approved equal.
7. Wire Nuts
 - a. For Unclassified Areas - Hexagonal-shaped for use with a nut driver, compact swept-wings, ribbed cap, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).

- 1) Ideal - Models 341 and 342.
 - 2) 3M - Models 212, 312, and 512.
 - 3) Buchanan - Models B-1, B-2, and B-4.
 - 4) Or approved equal.
- b. For Wet, Corrosive, and Hazardous Areas - Compact swept-wings, ribbed cap, filled with non-hardening sealant, UL listed for 600V with temperature rating of 105 degrees C (221 degrees F).
- 1) Ideal - Model DB Plus.
 - 2) Buchanan - Model BTS2 and BTS4.
 - 3) Or approved equal.
8. Bolted Wire Connectors - Mechanical connectors for all combination of copper and aluminum conductors. Connectors shall be of a compact high-strength design, tin-plated copper alloy, two-piece connector, and shall utilize two hex head bolts.
- a. Burndy - Model KVSU.
 - b. Ideal.
 - c. Ilsco Corp.
 - d. Or approved equal.

2.03. WIRING DEVICES

A. Wall Switches

1. Types, Manufacturers, and Catalog Numbers

Contact	P&S	Leviton	G.E.	Hubbell
1-pole	20AC-1	1221-2	GE5951-1G	1221
2-pole	20AC-2	1222-2	GE5952-1G	1222
3-way	20AC-3	1223-2	GE5953-1G	1223
4-way	20AC-4	1224-2	GE5954-1G	1224
3-pos.	1225	--	GE5957-1	1387
Pilot, 1-pole	20AC-1-RPL	1221-PL	SP121-8G	1221PL
Locator, 1-pole	PS20AC-1-CSL	1221-LHC	SL122-2G	1221IL

Hazardous Area, Class I, Divisions 1 and 2, 1-pole factory sealed snap switch or manual motor starting switch - Crouse Hinds, Model EDS Series; or Appleton, Model EDS Series with selector switch covers.

B. Receptacles (Note: All receptacles shall be "side wired" style. "Push-in" styles are not acceptable.)

1. Single Convenience Receptacle

- a. Pass & Seymour, Inc. - Model 5361.

- b. Hubbell - Model 5361.
 - c. General Electric - Model 4102.
 - d. Leviton - Model 5361.
- 2. Duplex Convenience Receptacle (Interior Use Only)
20 amp, 125 volt.
 - a. Pass & Seymour, Inc. - Model 5362.
 - b. Hubbell - Model 5362.
 - c. General Electric Co. - Model GE5342.
 - d. Leviton - Model 5362.
- 3. GFCI Receptacle
 - a. Pass & Seymour, Inc. - Model 2091-S.
 - b. Hubbell - Model GF-5362.
 - c. General Electric - Model GFR-5342.
 - d. Leviton - Model 6899.
- 4. Dust and Moisture-Resistant Receptacle, Gray Face, Exterior Use
 - a. Pass & Seymour, Inc. - Model CR6307.
- 5. Explosionproof Receptacle, Class I, Division 1, 20-Amp, 125-Volt
 - a. Single gang, feed-thru units.
 - 1) Crouse Hinds - Model ENRC21201.
 - 2) Appleton Electric Company - Model EFSC175-2023.
 - b. Single gang, dead-end units.
 - 1) Crouse Hinds - Model ENR21201.
 - 2) Appleton Electric Company - Model EFS175-2023 Company.
- C. Verify wall openings are neatly cut and will be completely covered by wall plates.
- D. Wall Plates - Install receptacle and switchplates in accordance with the following schedule:
 - 1. Interior, Unclassified
 - a. Finished Areas - Standard ivory non-metallic.

- b. Unfinished
- 2. Concealed Wiring - Standard non-metallic brown plates.
- 3. Surface Mounted Raceway - Standard brown non-metallic receptacle plates. Standard brown non-metallic switchplates.
- 4. Interior, Wet Areas
 - a. Non-metallic weatherproof receptacle plate.
 - b. Stainless steel switchplate.

2.04. GROUNDING

- A. Existing ground system shall remain intact. Any portions that are disturbed during construction shall be restored or replaced.
- B. Size of grounding and bonding conductors shall be as shown but not smaller than required by the NEC, Articles 250-66 and 250-122.

2.05. PANELBOARDS

- A. General
 - 1. Interiors
 - a. All interiors shall be completely factory assembled.
 - b. Neutral bars to be full size and insulated. Neutral bussing to have suitable lugs for each feeder. In subfeed panels, neutral shall be isolated from ground.
 - c. Provide a ground bus in each panel.
 - 2. Boxes
 - a. Provide at least minimum gutter space in accordance with NEC.
 - b. Provide a minimum of four interior mounting studs.
 - 3. Trim
 - a. Provide barriers as required for completely dead-front construction.
 - b. Provide minimum projection, chrome-plated latch with key lock on panelboards. Key all locks alike.
 - c. Provide heavy plastic cover over permanent directory.

4. Bus Bars - All main bus bars shall be tin-plated copper sized in accordance with UL Standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above air ambient of 40 degrees C maximum.
5. Circuit Breakers – All branch circuit breakers shall be bolt-on type.

B. Lighting Panelboards (LP)

1. Definition - Lighting panelboards shall operate at 208Y/120 volt, 3 phase, 4 wire power. The panel may contain circuit breakers to power lighting and receptacles. The panel may contain breakers to power equipment other than lighting and receptacles.
2. Panelboard breakers shall be molded case, thermal magnetic trip, bolt-on connection, quick-make, quick-break, toggle handle circuit breakers. Two- and three-pole units shall be internal common trip type. Contacts shall be silver alloy.
3. All panelboard buses shall be tinned copper. Provide optional neutral and ground buses.
4. Main circuit breakers shall be rated 10,000 A.I.C. or as indicated on the Drawings.
5. Panelboards for use at 240 volts AC maximum shall incorporate branch circuit breakers as shown or scheduled rated at 10k A.I.C. symmetrical at 240 volts.
6. Provide lighting panelboards as scheduled on the Drawings.
7. Panelboard enclosures shall be NEMA 12, unless noted otherwise on the Drawings.
8. Manufacturers
 - a. Design Basis – Square D Model NQOD.
 - b. General Electric.
 - c. Siemens.

C. Equipment Panelboard (PP)

1. Definition – Equipment panelboards are to operate on 480Y/277 volt, 3 phase, 4 wire power. Equipment panelboards shall not have a main circuit breaker larger than 225 amps. Equipment panelboards shall not have branch circuit breakers larger than 70 amps. The panel may contain circuit breakers to power lighting.
2. Panelboard Breakers - Molded case, thermal magnetic trip, bolt-on connection, quick-make, quick-break, toggle handle circuit breakers. Two- and three-pole units to be internal common trip type with silver alloy contacts.
3. All panelboard buses shall be tinned copper. Provide optional neutral and ground buses.
4. Main Circuit Breakers - Rated at 22,000 A.I.C. or as indicated on the Drawings.

5. Panelboards for use at 480 or 600 volts AC maximum to incorporate branch circuit breakers as shown or scheduled rated at 22,000 A.I.C. symmetrical at 480 volts.
6. Provide equipment panelboards as scheduled on the Drawings.
7. Panelboard enclosures shall be NEMA 12 unless noted otherwise on the Drawings.
8. Manufacturers
 - a. Design Basis - Square D Model NF.
 - b. ABB.
 - c. Siemens.

2.06. DISCONNECT AND SAFETY SWITCHES

A. Definitions

1. Disconnect Switches - Non-fusible switches.
2. Safety Switches - Fusible switches.

B. Characteristics

1. Heavy-duty type construction.
2. Number of poles shall be equal to the number of current carrying conductors.
3. Lockable in “off” or “open” and in the “on” or “closed” position.
4. Quick-make, quick-break switch mechanism.
5. Dual cover interlock to prevent opening of the switch door when handle is in the “on” position, and to prevent closing of switch mechanism with the door open. Provide a defeat mechanism.
6. Visible blade construction.
7. Single throw unless noted otherwise.
8. All main service disconnects shall come with an AR Type” fuse rejection kit.

C. Ratings

1. 600 volts for 480V systems and 240 volts for 208V systems. Ampere or horsepower rating as shown or required.
2. RMS symmetrical interrupting rating shall be 100,000 amperes for main service, 10,000 amperes otherwise.
3. Lugs shall be rated and U.L. listed for 60 degrees C and 75 degrees C wires.

D. Enclosures

1. U.L. listed.
2. NEMA 4X stainless steel for exterior and wet locations; NEMA 4X non-metallic for corrosive areas; all others NEMA 12.
3. Provide with enclosure-mounted handle operator, operating through approximately 180-degree arc.

E. Fuses - Dual element RK1 current limiting type, time delay. Bussman Low-Peak LPN-RK or equal.

F. Manufacturers - Heavy-duty Square D Class 3110; General Electric Type TH; Westinghouse Type H-600; or equal.

2.07. NAMEPLATES AND LABELS

A. Nameplates

1. Material - Rigid laminated plastic.
2. Lettering Height - 5/16-inch high.
3. Lettering Color - White.
4. Background Color - Black.

B. Labels

1. Self-debossing, aluminum foil type.
2. Typewritten or preprinted black legends on white background.
3. Permanent Pressure-Sensitive Adhesive - Provide high temperature adhesive for labels on heat producing devices.
4. Use preprinted sleeve type for conductors. Label at each termination or splice.
5. Manufacturers - Seton or equal.

C. Equipment and Control Identification

1. In addition to the requirements of the NEC, install an identification label which will clearly indicate information required for use and maintenance of items such as panelboards, cabinets, motor controllers (starters), safety switches, separately enclosed circuit breakers, individual breakers and controllers in switchgear and motor control assemblies, control devices and other significant equipment.
2. Provide nameplates for all electrical equipment and controls.

3. Attach nameplates with stainless steel or other non-corrosive metallic rivets or screws.
4. Provide a nameplate at each remote switch or control device when the controlled function is not readily identifiable.
5. All wiring except major power conductors shall have each end of the conductor labeled. Label wires at each junction box.

2.08. SPARE DEVICES

A. Provide the following spare devices:

1. Two main fuses (installed in service switch enclosure).
2. One each of all other fuses.
3. One spare 20-amp, single-pole branch breaker, installed in panelboard.
4. Two spare bulbs of each type, store in a NEMA 4X non-metallic enclosure 16-inch by 16-inch by 8-inch minimum. Provide two full width/depth adjustable shelves.

PART 3 EXECUTION

3.01. CONDUIT INSTALLATION

A. Conduit System Fabrication

1. All interior conduit shall be installed exposed. No conduit shall be in or under slabs except for building incoming/outgoing systems.
2. No conduits within walls where the walls are below grade, i.e., in basements or galleries.
3. No conduit shall be run on the exterior face of any structure unless specifically shown exposed or approved by the Engineer prior to installation.
4. Conduit Defects - All conduit runs, cuts in coatings, to be free of indentations, elliptical sections, blisters, and other defects. Repair or replace damaged conduit sections as instructed by the Engineer.
5. Conduit Cutting - Cut all conduit ends square and remove all burrs. Cut conduit ends exactly to avoid excessive penetration into boxes.
6. Expansion Joints - Provide approved conduit expansion joints wherever conduit crosses a structural expansion joint; is attached between two separate structures; the conduit run is 50 feet or more in a single length for Types B, C, D, and D-1 conduit or 100 feet or more for Types A and E; or wherever shown or specified. Support conduit on each side of the expansion joint.

7. Preparation for Conductor Installation - Prior to pulling cables in any conduit system, thoroughly clean the inside of each length of conduit by swabbing or the use of compressed air to remove all foreign matter. Then temporarily plug the ends of each conduit to prevent the entrance of dirt or foreign matter.
8. Couplings
 - a. Tightly butt ends of conduit into the couplings.
 - b. In exposed work only, where standard couplings cannot be used, only union-type couplings are permitted or as otherwise acceptable to the Owner.
9. Cutting of Structures - Keep the cutting of walls or floors for conduit to a minimum. Where such cutting is absolutely necessary, take care so as not to weaken the walls or floor involved. Do not cut beams or other structural supports under any condition.
10. Connection to Devices - Conduit attachment to all electrical equipment, such as sheet steel junction boxes, pullboxes, switches, etc., to be made with approved fittings with non-metallic bushings. All Type C conduits shall use compression fittings only. Set screw fittings are not acceptable.
11. Conduit Bends and Elbows
 - a. Rigid Metallic Conduit Systems (Types A, B, C, and E)
 - 1) Heating metal conduit to facilitate bending is strictly prohibited.
 - 2) Field bending metal conduit is permitted as follows:
 - a) Types A, B, and E - Up to and including 3/4-inch size.
 - b) Type C - Up to and including 1-1/4-inch size.
 - 3) For all rigid metal conduit larger than that above, use manufactured elbows or use hydraulic one-shot bender to fabricate bends.
 - 4) Use manufactured elbows for all bends in Type A, B, and E conduit systems.
 - 5) Make all bends with radius no less than N.E.C. requirement.
 - b. Rigid Non-Metallic Systems (Types D, D-1, DB, and EB)
 - 1) Join non-metallic conduit using cement as recommended by manufacturer. Wipe non-metallic conduit with appropriate cleaner, then dry before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
 - 2) Field bending of Types D and D-1 conduit is permitted only if a "hot box" is used.

- 3) Make all bends with radius no less than NEC requirement.
 - 4) Kinked or crimped conduit bends are not acceptable. Remove and replace all such bends.
 12. Routing of Conduits - Keep the number of bends, offsets, and crossovers to a minimum; however, not more than three 90-degree elbows or equivalent bends up to 270 degrees is to be installed in any run between pulling or access fittings.
 13. Structural - Make holes around conduit or cables watertight or gas-tight via silicone or acrylic latex masonry sealant upon completion of conduit or cable system.
- B. Conduit Size - Minimum conduit sizes shall be as follows unless specifically shown otherwise:
 1. 3/4-inch for exposed locations (includes those areas above drop ceiling of lay-in tiles).
 2. 1-inch for any concealed conduit in walls or within or beneath slabs.
 3. 2-inch for any conduit in ductbanks (unless specifically shown otherwise).
- C. Changes in Conduit Sizes - Made at pull or junction boxes except where specifically shown via a pull fitting.
- D. Conduit and Sleeve Sealing
 1. Seal inside of conduit (after installing and testing conductors) where passing through exterior walls or walls containing vapor seals or required to be gastight. Sealing may be accomplished by locating junction or approved sealing fitting at wall and filling with an approved waterproof electrical putty or sealing compound. Seal around all interior conduit passing through floor and wall boxouts.
 2. Where driptight and watertight NEMA 4X and 12 installations are required, use only watertight hubs for top or side entry. Locknuts with gaskets are not acceptable. Conduits entering the top of electrical equipment are to either be sealed or located in such a manner as to prevent water from entering the equipment through the conduit system. Install conduit for ease of sealing.
 3. Provide boxouts where conduit passes through poured-in-place concrete floors or walls. Core drill all other concrete walls, new or existing. Make cores 1-inch minimum, larger than O.D. of conduit.
- E. Interior Walls
 1. Non-Fire Rated Walls
 - a. Between Unclassified Areas
 - 1) No Drop Ceiling or Below Drop Ceiling - Use core drilled holes.

2) Above Drop Ceiling

- a) Air Handling Space - Core drill holes and seal around conduit.
- b) Not Air Handling Space - Box out wall for conduits.

b. Between Classified or Classified/Unclassified Areas

- 1) Use core drilled hole. In masonry wall, seal with non-shrink grout to within 3/4-inch of wall face. Seal gastight and watertight with silicone acrylic latex masonry sealant. Fill hollow masonry voids with grout.

In concrete wall, seal around conduit with modular neoprene links and stainless steel compression bolts.

F. Access Fittings

- 1. May be used as required to facilitate installation of conductors or where shown.
- 2. Provide access fittings or conductors, as manufacturer recommends so as not to damage conductor or insulation during conductor pulling operations.

G. Pull and Junction Boxes - All pull and junction boxes shall be installed where shown or specified. Additional boxes may be installed as required to facilitate installation of conduit system.

3.02. CONDUCTOR INSTALLATION

A. Installation

- 1. Install products in accordance with manufacturers' instructions.
- 2. Do not pull thermoplastic wire at temperatures below 35 degrees F.
- 3. Protect exposed cable from damage.
- 4. Provide Kellem support grips when electrical cables hang in a vertical, sloping, or horizontal position.
- 5. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- 6. Install electrical circuit loadings as designed on Contract Drawings unless approved otherwise by Engineer.
- 7. Where instrumentation cables are installed in panels, etc., the Contractor shall arrange wiring to provide maximum clearance between instrumentation cables and other conductors. Instrumentation cables shall not be installed in the same bundle with conductors of other circuits.
- 8. Intrinsically safe conductors shall be in separate conduits both inside and outside enclosure and shall be terminated on terminal strips with barriers. Barriers are to physically isolate intrinsically safe conductors from non-intrinsically safe conductors.

9. Installation in Concrete Manholes and Handholes - Neatly bundle conductors and train them around the outside (long way around) of the enclosure. Support conductors from hooks or cable supports inside of enclosure.
10. Wiring Diagrams
 - a. Any wiring diagrams shown on plans for hookup of equipment furnished by others are approximate and are for bidding purposes only.
 - b. Obtain wiring diagrams, certified correct for the job, from respective supplier for all equipment and systems furnished by them.
 - c. Install all work in accordance with certified wiring diagrams.
11. Electrical Trade to provide all power, control, and signal wiring and conduits between system components (including installation of any conductors supplied by other trades), including final connections to labeled terminal strips integral in equipment, as shown on Drawings, and in accordance with approved manufacturer's wiring diagrams. Exception is for certain HVAC conduit and wiring where specifically shown or specified to be by HVAC trade.

B. Color Coding

1. Provide color coding for all service, feeder, branch, control, fire alarm, and signaling circuit conductors.
2. Grounded Conductor Color Coding in New Installations
 - a. Ground – Green.
 - b. Neutrals – White for 120V systems; gray for 277V systems.*

*Exception - Where neutrals of more than one system are installed in the same raceway or box, each neutral shall be white or gray with a different colored (not green) stripe.
3. In addition to existing facilities, ungrounded conductors in different voltage systems shall match the existing system and/or be as follows:
 - a. 120/208-volt, 3 phase: Phase A - Black
120/240* Phase B - Red
 Phase C - Blue

*For high ("wild" or red) leg delta system, the high leg shall be orange.
 - b. 277/480-volt, 3 phase: Phase A - Brown
 Phase B - Orange
 Phase C - Yellow
 - c. 120/208 or 120/240-volt, single phase: Red and Black

- d. DC Power: Positive Lead - Red.
Negative Lead - Black
- e. DC Control - All Blue
- f. 120-volt Control Wiring - Single conductor AC control wire shall be red, except a wire entering a motor control center compartment or control panel which is an interlock shall be color coded yellow.
- g. 24-volt Control Wiring - Orange
- h. Neutral (Grounded Conductor) - White or Gray
- i. Grounding Conductor - Green

C. Conductor Sizing

- 1. Conductor sizes that are shown for equipment branch circuits are the minimum sizes allowed. Refer to Schedule in paragraph 3.02.C.2.c. below for sizing conductors on circuits longer than the minimum length shown for the various voltages. Adjust conduit sizes accordingly.
- 2. Wiring shown without size to be sized by one of the following methods, whichever is larger. No additional payment will be made for oversized conduit or conductor.
 - a. Power and Lighting Circuits - Minimum size No. 12 AWG. Quantity as required for proper operation. Use 3/4-inch conduit types as required for the area where conduit is installed.
 - b. Control Circuits - Minimum size No. 14 AWG. Quantity as required for proper operation, use 3/4-inch conduit, type as required for the area where conduit is installed.
 - c. Increase minimum size conductors for 20 ampere single phase circuits where distance between power source and item served exceeds noted length in accordance with the following table. No more than 2 percent voltage drop of all branch circuits at equipment's rated full load current is permitted.

120 Volts	100' to 150'	#10	151' to 225'	#8	226' up	#6
208/240 Volts	100' to 175'	#10	175' to 250'	#8	251' up	#6
265/277 Volts	125' to 200'	#10	201' to 300'	#8	301' up	#6
460/480 Volts	225' to 350'	#10	351' to 525'	#8	526' up	#6

- d. Minimum size of branch circuits over 20 amps per requirements of NEC Tables 310.16 thru 310.31.
- 3. Neutral Wire - To be equal to ungrounded wires unless otherwise shown.
- 4. Ground Wire - Minimum size as required by the NEC Table 250-122.

- D. Spare Conductors - Wherever groups of control and instrumentation conductors are required, provide the following minimum numbers of spare conductors. As required, Contractor shall increase conduit sizes shown to accommodate spare conductors. Terminate at terminal strips on both ends and mark as spare and indicate the location of opposite end.

Conductors	Spares
Up to 10	4
11 to 18	6
19 and over	8

3.03. CONDUCTOR STRANDING

- A. All conductors shall be stranded except for interior lighting and receptacle circuits #10 and smaller.

3.04. CONNECTORS AND TERMINATIONS

- A. Use manufacturer's standard lugs for connection of conductors to equipment panel or devices.
- B. Use UL approved wire nuts for lighting and receptacle circuits and for other circuits, compression connectors for connection of conductors to other conductors.
- C. Terminal Board Terminations - All interconnecting instrumentation wiring to terminal boards and strips to be made with insulated crimp type connectors (locking fork type). Stranded wire is not to be directly connected to terminals without the use of connectors unless the terminations are specifically made to accept bare stranded wire, i.e., tubular clamp type termination. No loose strands shall be permitted outside of the connector, whichever is utilized.
- D. Motor Connections
1. Motors Less Than 1 HP - Use wire nut appropriate for the environment where the motor is located.
 2. Motors From 1 to 20 HP - Use branch circuit crimp-type connectors.
 3. Motors Above 20 HP - Use bolted wire connectors. Insulate the connector with insulating putty to at least 7/64 inch and tape the insulated connection with two layers half lapped of neoprene splicing tape.
- E. Splicing - Make splices in accessible locations and in junction boxes. No splices will be permitted in pulling fittings or MCC wiring spaces.

3.05. GROUNDING

- A. Maintain electrical integrity of conduit system throughout. Provide bonding jumpers at fittings as required; jumpers to be no longer than required. Provide separate ground wire for all conduit systems and where grounding integrity is doubtful.

- B. Basic intent of grounding specification is that grounding conductor be completely separate from system neutral and that neutral only be connected to ground at the main service grounding point. Run equipment ground independently back to main service ground. Use separate insulated (green) grounding conductors for all grounding conductors. Where ground passes through panels and disconnects, braze ground lugs to panel or disconnect housings. Isolate neutral bus or lug from ground. Ground all conduits at each panel.
- C. Shielding to be continuous and grounded at one point only unless otherwise required by equipment manufacturer's recommendations.

3.06. EQUIPMENT AND DEVICE MOUNTING HEIGHTS

A. MOUNTING HEIGHTS ARE AS FOLLOWS, UNLESS OTHERWISE NOTED:

- 1. Receptacles - 48 inches.
- 2. Switches - 45 inches to the center.
- 3. Thermostats - 54 inches.
- 4. Enclosed Starters or Circuit Breakers
 - a. Wall Mounted - 66 inches to top.
 - b. Interior Mounting Stand/Exterior Not on Tank – 36 inches to center of operating handle for equipment less than 60 inches high.
 - c. Exterior Mounting on Tanks – 36 inches to center.
- 5. Control or Starter Panels - See Section 16161, Control Panels and Enclosures.
- 6. Panelboards - 66 inches to top.
- 7. Disconnect Switches - See Section 16161, Control Panels and Enclosures.

END OF SECTION

SECTION 16100

GROUNDING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Items to be grounded include all new or modified work of this Contract, but not be limited to metallic water services, equipment housings, motor frames, metal raceways, bus duct enclosures, grounding terminals of outlets, outdoor lighting fixtures, footing rebar, ductbanks, manholes, pullboxes, and transformer secondary neutrals. In addition to the National Electrical Code (NEC) requirements and the above, the following, where a part of this project, shall be permanently and effectively grounded:
 - 1. All structural metals.
 - 2. All metallic panels and conduit.
 - 3. Motor frames.
 - 4. All metallic equipment bases.
 - 5. Metallic handrailing.
- B. Take special precautions to ground all equipment in strict accordance with the NEC and as otherwise noted in these specifications.

1.02. REFERENCES

- A. All materials and installations shall be in accordance with the latest revisions of the following:
 - 1. National Electrical Code
 - 2. Underwriters Laboratories, Inc.

1.03. SUBMITTALS

- A. Provide submittals and samples in accordance with Sections 01300, Submittals, and 16055, Electrical Work..
- B. Submitted for all materials used in connection with the grounding system.
- C. Submit a 12-inch sample of the ground system rope-lay conductor and other samples as may be requested by the Engineer.
- D. Certified test reports of grounding system resistance.

PART 2 MATERIALS

2.01. ELECTRODES

- A. Ground Rods – 5/8-inch diameter x 10 feet long (minimum) steel core copper jacketed. Rods shall be manufactured by Copperweld Steel Company, Thompson Lightning Protection, Inc., or equal.
- B. System shall be UL listed.
- C. System access from grade shall incorporate the use of a concrete or polyplastic box for protection with a steel cover. Box shall be installed flush with finish grade.
- D. Manufacturers
 - 1. Superior Grounding Systems.
 - 2. XIT Grounding System or approved equal.

2.02. CONDUCTOR

- A. Ground Conductor (Above Grade) - Type XHHW insulated wire in conduit or other raceway. Color code insulation per NEC.
- B. Ground System Conductor (Buried) - Soft drawn or soft annealed stranded copper, tinned bare conductor woven to form "rope-lay" type.
- C. Equipment Bonding Conductor - For sizes 8 AWG and smaller, solid ASTM B1. For sizes 6 AWG and larger, stranded ASTM B8.

2.03. CONNECTORS

- A. Compression-Type Fittings
 - 1. Construction - Two bolts and a minimum of 1-1/2 inches in length.
 - 2. Manufacturers
 - a. Thomas & Betts
 - b. Burndy Corporation
- B. Welded Connection
 - 1. Construction - Molded fusion-welding process.
 - 2. Manufacturers
 - a. Cadweld
 - b. Thermoweld

C. Mechanical Connection

1. Construction - Mechanical lugs securely fastened using silicon bronze hardware.
2. Manufacturers
 - a. Thomas & Betts
 - b. Burndy Corporation

PART 3 EXECUTION

3.01. GROUND SYSTEM DESCRIPTION

- A. Install ground system or grid as shown on the Contract Drawings. Install such that tops of driven ground rods are a minimum of 12 inches below grade. Ground rods are to be driven at least 2 feet below the groundwater level. Depth of the conductor system is to be 30 inches minimum with a minimum length of .20 feet. Thermoweld rods to copper, rope-lay grounding conductor or use approved mechanical connections to rods where grounding conductor is No. 4 or smaller.
- B. When rods are shown and cannot be driven due to boulders or rock formations, install grounding plates below groundwater level or a minimum of 6 feet below grade.
- C. Final resistance to ground of completed ground system shall be a maximum of 5 ohms. If tests indicate higher than 5 ohms resistance, then the Contractor shall install additional rods or plates at no additional cost to Owner to lower the resistance to below 5 ohms.

3.02. CONNECTIONS

- A. Buried Connection - Made with either thermal welded or compression fitting specially made for grounding systems
- B. Exposed Connection - Made with grounding system compression-type fittings.
- C. Connection to Metal - Make all connections to water pipes, steel surfaces, etc., using mechanical connectors.
- D. Thoroughly clean all surfaces to bright bare metal to accept ground connections.

3.03. GROUNDING ELECTRODE CONDUCTOR

- A. Size per NEC 250-66 unless larger size is shown or specified below.

3.04. BUILDING GROUND CONNECTION

- A. Connection from main ground to building system shall be as specified herein and as required. Positively connect equipment housings and conduit system to main service ground, only at main service ground.

3.05. INDIVIDUAL GROUNDS

- A. If individual equipment or individual building grounds are made, separate grounding conductors (in earth where possible) shall connect these grounds to main service ground. (This requirement applies only within each system of subsystem fed from a distribution transformer.) Intent is that main ground shall be at the main or incoming power source and not at utilization point unless positively connected to same.

3.06. INTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Electrical integrity of conduit system shall be maintained throughout. Provide bonding jumpers at fittings as required; jumpers shall be no longer than required. Provide separate ground wire for all conduit systems.

3.07. EXTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Provide separate ground wire for all conduit systems leaving the building interior. Size per NEC 250-122 in NEC.

3.08. FEEDERS

- A. Include an insulated grounding conductor, sized per NEC 250-66, in each conduit. Bond all served equipment frames, enclosures, ground bars, etc., to this conductor. Make all conductor terminations and connections using compression lugs or fittings designed and UL labeled for the purposes.

3.09. SEPARATE GROUND

- A. Basic intent of grounding specification is that grounding conductor be completely separate from system neutral and connect neutral to ground at the main service grounding point only. Run separate insulated (green) grounding conductors from all grounding points independently back to main service ground. Where ground passes through panels and disconnects, ground lugs shall be brazed or bolted to panel or disconnect housings with neutral bus or lug isolated from same. Ground all metallic conduits at each panel. Clean paint from metal to accept ground lugs.

3.10. METALLIC, NON-CURRENT CARRYING ENCLOSURE

- A. Connect to ground bar at load center supplying same through conduit system using proper fittings at junction boxes, expansion joints, and between ground bushings on each conduit within all sheetmetal enclosures.

3.11. SHIELDED CABLE

- A. Shielding to be continuous and grounded at one point only unless otherwise required by equipment manufacturer's recommendations.

3.12. CONDUIT SEALS

- A. Where non-metallic conduits protecting grounding conductors enter the building from the exterior, provide watertight wall seals on each conduit and a sealing bushing on the enclosed conductor. Sealing bushings on all conduits penetrating the floor. Make bonding jumper connection to metallic conduit, where equipped with sealing bushings, with water pipe ground connections of proper size. Seal watertight the inside of all conduits.

3.13. GROUND CONDUIT LABELS

- A. Label all service, equipment frame or motor grounding conduits containing only grounding conductors "_____ Ground." Label to identify item being grounded.

3.14. INDIVIDUAL MOTOR CONNECTION

- A. Make connections from frames of motors over 50 HP directly to the exterior/buried ground system. Motors up to this HP shall be connected to the circuit or raceway grounding system. Where motor is separate from and not mounted on a major equipment frame, bond frame to motor ground.

3.15. MAJOR EQUIPMENT FRAMES

- A. Make connection from major equipment frame, i.e., belt dewatering equipment, mechanical screens or grit equipment, directly to the exterior/buried ground system. Conductor shall be installed in conduit and full length from the grounded item to outside below grade.

3.16. CONCRETE MANHOLES

- A. Provide one 5/8-inch diameter by 10-foot long ground rod in or at each manhole.
- B. Provide No. 6 ground conductor from ground rod to all metallic parts including cable racks and manhole frame.
- C. Bond ductbank grounds to manhole ground rod.

3.17. DUCTBANK GROUND CONDUCTOR

- A. Bond ductbank ground conductor when a new building ground system was not provided, install a new ground rod and bond the ductbank ground conductor to it.
- B. Bond ductbank grounds to manhole ground rod, if available.

END OF SECTION

SECTION 16161

CONTROL PANELS AND ENCLOSURES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal blocks.
- D. Control stations.
- E. Accessories.

1.02. REFERENCES

NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 4	Terminal Blocks for Industrial Control Equipment and Systems
ANSI/NFPA 70	National Electrical Code
UL	Underwriters Laboratories, Inc.

1.03. SUBMITTALS

- A. Submit under provisions of Sections 01300, Submittals, and 16055, Electrical Work.
- B. Submit shop drawings for all control panels. The submitted information shall be detailed specification information proving compliance to these specifications. Submittals shall include, but not be limited to, the following:
 - 1. Enclosure information including size and NEMA classification.
 - 2. Subpanel layout.
 - 3. Wiring diagrams and elementaries.
 - 4. Bill of materials.
 - 5. Internal components (specification information, cut sheets).
 - 6. List of nameplate titles.
 - 7. Dimensions.
- C. Shop drawings shall be submitted for all materials used as enclosures.
- D. Submit equipment and material samples as requested by the Engineer.

- E. Manufacturer's Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.06. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F. The supplier of the station control panel enclosure at the Cove Road Pump Station shall provide detailed heating and cooling calculations. These calculations shall demonstrate sufficient heating and/or cooling capacity to maintain the enclosure temperature between 40 and 100 degrees F.

1.04. DEFINITIONS

- A. Power Wiring - Shall mean conductors, conduit, wireway and connections, and related electrical work to supply electrical power to equipment, including electrical power to supply point for equipment control systems.
- B. Control Wiring - Shall mean conductors, conduit, wireway, construction and related work to connect or interconnect relays, solenoids, contact devices, signal lights and audible signals, as well as any and all other electrical control devices indicated as related to the control functions.
- C. Control Panel (CP) - Is an enclosure used to house logic or power devices such as CPT, starters, contactors, relays, timers, and may also contain pilot devices.
- D. Control Station (CS) - Is an enclosure used to house pilot devices only, such as pushbuttons, indicating lights, and selector switches.

1.05. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

1.06. EXTRA MATERIALS

- A. Furnish under provisions of Section 01700, Contract Closeout.
- B. Provide two of each cabinet key.
- C. Provide a box of each size and type of control circuit fuses.
- D. Provide three of each size and type of 3 phase power fuse.
- E. Provide one of each size and type of single phase power fuse.

PART 2 PRODUCTS

2.01. MANUFACTURERS - NEMA 4 EPOXY COATED

- A. Hoffman - Model Series EPLP
- B. Appleton - Model ECH/ECHE
- C. Or approved equal

2.02. MANUFACTURERS - NEMA 4X STAINLESS STEEL

- A. Hoffman - Model Series SSLP
- B. Hammond – 1418NA S.S. Series, wall mounted; 1422NA S.S. Series, floor mounted
- C. Or approved equal

2.03. MANUFACTURERS - NEMA 4X NON-METALLIC

- A. Carlon - Model "Himeline" Series HL
- B. Hammond – "PJ" Series
- C. Or approved equal

2.04. MANUFACTURERS - NEMA 7

- A. Killark - Model "Quantum" Series EXB
- B. Appleton - Model EXB
- C. Or approved equal

2.05. MANUFACTURERS - NEMA 12 SINGLE DOOR

- A. Hoffman - Model Series LP
- B. Hammond – 1418 Series
- C. Or approved equal

2.06. MANUFACTURERS - NEMA 12, TWO-DOOR AND FREE STANDING

- A. Hoffman - Model Series ULP and FS
- B. Hammond – 1418 Series
- C. Or approved equal

2.07. SHEET METAL ENCLOSURE FABRICATION

- A. After fabrication and assembly of all sheet metal enclosures, grind all welds smooth, and then thoroughly degrease and clean. Apply at least two coats of rust inhibiting primer or undercoat of the manufacturer's standard quality followed by at least two coats of baked enamel or epoxy finish. For exterior enclosures utilizing an epoxy finish, the enclosure shall have a final overcoat of clear acrylic polyurethane.

Finish Color of All Enclosures - ANSI 61 Light Gray.

- B. Turn back edges and file all sharp corners smooth.
- C. Enclosure Opening
1. Roll lips on all sides.
 2. Provide neoprene gasket.
 3. Provide drip shield kits for exterior enclosures.
- D. Doors
1. Rolled lips on unhinged sides (three sides).
 2. Full length piano type hinges.
 3. Provide all front or rear panel doors with door holders sized appropriately for the weight of the equipment on the door.
 4. NEMA 4X and 12 Door Latches - 1/4-turn handle.
 5. Hinged doors over 24 inches high shall have latching device at three points.
 6. Provide mechanical interlock between door and panel power disconnect mechanism. The interlock is to prevent the door from opening while the disconnect switch is closed. Provide an unlabeled defeater mechanism to permit qualified personnel access to panel while it is powered.

2.08. ACCESSORIES

- A. Manufacturer - Cable Ties
1. Thomas & Betts - Model Nylon TY-WRAPs.
 2. Burndy – Ty-Wrap.
 3. Or approved equal.

B. Manufacturer - Terminal Blocks

1. Buchanan - Model 0241.
2. Connectron - Model N553.
3. Or approved equal.

C. Manufacturer - Wire Duct

1. Stahl Brothers - Model XT-Panel Channel.
2. Panduit Corporation - Model Type E-Dark Grey.
3. Or approved equal.

D. Manufacturer - Grounding Terminals

1. Burndy - Model OA4C-AB.
2. IlSCO Corp.
3. Or approved equal.

E. Provide one drawing pocket in the panel, minimum size 10 inches wide by 10 inches high by 1/2 inch deep, panel manufacturer's standard material and finish.

F. Power Disconnect Switch - Built in to flange of enclosure with door interlock. Through-the-door types will not be acceptable.

2.09. ENCLOSURE – HVAC

- A. The station control panel enclosure at the Jackson Avenue Station shall be provided with heating, ventilating and/or air conditioning equipment as necessary. This equipment shall be sized to maintain a temperature above 40 degrees F and below 100 degrees F to accommodate the VFDs and instrumentation located within the enclosure.

PART 3 EXECUTION

3.01. ELECTRICAL CONTROLS

- A. Shall be in accordance with Section 16900, Auxiliary Controls and Relays.

3.02. POWER CIRCUIT PROTECTIVE DEVICES

- A. Shall be in accordance with Section 16475, Overcurrent Protective Devices.

3.03. NAMEPLATES

- A. Provide nameplates on the exterior of each enclosure identifying the application or function of the enclosed equipment.

- B. Nameplates and labels per Section 16055, Electrical Work.

3.04. EQUIPMENT HOUSING TYPES

- A. Enclosure, Control Panel or Device Applications –When no type is shown or specified, provide stainless steel.
 - 1. Exterior Locations - NEMA 4 stainless steel
 - 2. Interior Wet Locations - NEMA 4 stainless steel
 - 3. Corrosive Areas - NEMA 4X stainless steel
 - 4. Hazardous Areas - NEMA 7
 - 5. All Other Areas - NEMA 12 painted

3.05. CONTROL PANEL CONNECTIONS

- A. Regardless of who furnishes or installs the various panels, all are connected electrically by the electrical trade unless specifically shown or specified otherwise.

3.06. FINISH REPAIR

- A. Repair damage to the factory finish in accordance with Section 09900, Painting. Depending on the extent of damage to the factory-finish and/or the closeness of the color match of any field-applied paint, a complete repainting may be ordered by the Owner at his discretion.

3.07. DOOR QUANTITY

- A. Provide two doors if panel is larger than 36 inches wide.

3.08. CONTROLS AND ASSOCIATED CIRCUITRY

- A. Each control panel shall contain all applicable disconnects, including a single main power disconnect (unless specifically shown otherwise on the drawings); motor circuit disconnect - one for each motor; necessary control pushbuttons; timers; relays; door interlock switches; indicator lights; selector switches; alarms; instruments and associated circuitry to monitor and control the associated equipment. Main power disconnect operating mechanisms shall be flange mounted not through the door.

3.09. CONTROL PANEL WIRING

- A. Wire Type - See Section 16055, Electrical Work.
- B. Wire Duct - Used for wiring between devices that are mounted on the back panel of control panels.

- C. Wire Bundling - Where it is not possible to run wire in wire duct, such as wire run from devices located in the back of a panel to devices mounted on the door of a panel, the wire is to be bundled. Wire lacing or twine is not acceptable.

Bundles are to be wrapped by a spiral plastic protective sheath. Secure bundles to the panel structure for a stable support with a spacing of no less than every 8 inches.

A wire bundle which must cross a hinge shall run along the hinge as far as possible or have a large loop in bundle and be secured at both ends so that the twisting is taken over the longest length of hinge possible. Wire shall not be split off from the bundle along this length.

- D. Wiring and Termination Methods - Interior wiring to be point-to-point with no splices. All wiring from and to the control panel to be through terminals located in the panel. Solderless insulated crimp-type locking fork lugs shall be used for terminations to screw-type terminals. Where screw-type terminals are not used, terminals shall be of the tubular clamp type. Install lugs such that no uninsulated wire is visible at the wire entry point, and wire strands are visible but not protruding from the screw connections end. Use solderless connectors or tubular clamp connectors for all connections to terminals and equipment.
- E. Shielded Wire - Separate from other wires and equipment with suitable barriers and with terminal blocks for continuous shield grounding to the connecting cables.
- F. Separate intrinsically safe wiring from all other wiring with barriers.
- G. Furnish panels factory-wired and tested with all equipment and appurtenances mounted thereon.
- H. Wire Labeling - Mark wires at both ends with numbers from Engineer-approved elementaries per Section 16055, Electrical Work.

Color coding per Section 16055, Electrical Work.
- I. Panel Wiring - All panel wiring shall be installed by the panel manufacturer.
- J. Lamp Test Switch – For panels with more than five indicating lights. Provide a single lamp test switch in lieu of push-to-test type indicating light.

3.10. TERMINAL BLOCKS

- A. Arrange terminals in alphabetic and numeric order in columns on removable subplates. Locate columns at least 4 inches from any edge of the subplate and space 6-inch on centers and at least 2 inches from a wiring duct.
- B. Provide marked terminals with wire number from Engineer-approved elementaries. Locate terminals with the same wire number adjacent to each other and jumpered.
- C. Make a maximum of two connections to each side of a terminal, including jumpers.

- D. Provide an additional 20 percent spare terminals with the following as minimum requirements:
 - 1. Power Terminals - Two spares.
 - 2. Control Terminals - Ten spares.
- E. At least one position on a terminal block must be reserved for termination of each incoming wire. Locate all such positions on the same side of the column of terminals. A wiring duct to feed the terminals must be sized to include wires for these positions.
- F. Connect all ground terminals of power receptacles solidly to the frame of the panel. Provide the panel with one grounding terminal in the control panel. Mount grounding terminals to the frame of the panel or rack.

3.11. WIRING DUCT

- A. Size wiring duct at 60 percent fill according to the maximum number of wires at any cross section, including field wiring terminations and spares. Wiring duct must be plastic.

3.12. CONTROL PANEL INSTALLATION

- A. Wall mount panel enclosures that are up to 48 inches in height; floor mount larger panel enclosures, unless otherwise noted on drawings.
- B. Furnish control panels, where shown, with power disconnect switches which will de-energize the power supply to the panel.
- C. Ground Panels - Connect all equipment and circuits in the panels shown or required to be grounded to the grounding conductors.
- D. Install panels where shown. Provide conduit entry as required for the installation.
- E. Upon completion of installation, the equipment manufacturer's representative shall check panels and make necessary adjustments.
- F. Panel manufacturer to mount all equipment shown or specified to be furnished with a panel. Furnish panels as completely assembled units.
- G. For all wall-mounted panels, provide a minimum of four brackets designed for wall mounting.

3.13. MOUNTING HEIGHT

Mount control panels such that:

- A. No disconnect handle is higher than 6 feet to the highest part of handle. Mount all separately enclosed circuit breaker and disconnect switch handles 4 feet 6 inches from floor or other working surface unless otherwise indicated (5 feet to the top of enclosure).
- B. Top of wall-mounted enclosures shall not be higher than 5 feet 6 inches.

- C. No pilot device is higher than 5 feet.
- D. No operator interface device (i.e., graphic display screen, etc.) is higher than 4 feet 6 inches to the centerline of the device.

3.14. ENCLOSURE INSTALLATION METHODS

- A. Support - Adequately support all enclosures from walls, structure, or on support panels or plates independently of the conduit system. Provide additional supports for seismic restraint.
- B. Support Material - Size fasteners utilizing a safety factor of 5.
- C. Mounting Accessories - Section 16191, Electrical Supports, Anchors, and Fasteners.

END OF SECTION

SECTION 16191

ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

1.02. REFERENCES

- A. NECA - National Electrical Contractors Association.
- B. ANSI/NFPA 70 - National Electrical Code.

1.03. SUBMITTALS

- A. Manufacturer's Instructions - Indicate application conditions and limitations of use stipulated by Product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.04. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01. PRODUCT REQUIREMENTS

- A. Materials and Finishes - Provide products which incorporate corrosion resistance adequate for the conditions in which they are to be installed.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products and designing system supports.

2.02. STEEL CHANNEL

A. Non-PVC Coated

1. Ductile Iron

- a. Description - Hot dipped galvanized steel channel designed for use with steel fittings, spring backed washers and nuts.
- b. Manufacturers
 - 1) Kindorf.
 - 2) Uni-Strut.
 - 3) B-Line.
 - 4) Globe.

2. Stainless Steel

- a. Description - For the purpose of this Section, all stainless steel shall be Type 316.
- b. All fasteners, fittings, clamps, saddles and accessories shall be stainless steel.
- c. Manufacturer
 - 1) Uni-Strut.
 - 2) B-Line.

B. Polyvinyl Chloride (PVC) Coated Materials

1. Hanger or support shall be hot dipped galvanized including the threads.
2. The zinc surface shall be treated with chromic acid prior to coating to enhance the bond between metal and plastic.
3. All surfaces shall be coated with an epoxy acrylic primer of approximately 0.0005-inch thickness.
4. The PVC coating shall be applied by the liquid fluidized bed method.
5. The coating material shall be compounded of pure materials and shall be free of any fillers or secondary plasticizers or gross, non-uniform characteristics.
6. A PVC coating shall be bonded to the galvanized outer surface of the product. The bond between the PVC coating and the product surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040-inch (40 mils) and a maximum thickness of 0.045-inch (45 mils).

7. Finished Color - Manufacturer's standard.
8. Manufacturers
 - a. B-Line Systems, Inc.
 - b. Perma-Cote Industries.
 - c. Occidental Coating Company (OCAL).
 - d. Robroy Industries (Plasti-Bond Red).
 - e. Kor Kap.

2.03. TWO-PIECE MALLEABLE IRON CLAMPS

- A. Cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp backs (spacers). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Cadmium-plated anchor and washer. Manufacturer - O-Z/Gedney, Thomas & Betts, Appleton, Raco, or equal.
- B. PVC coated cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp back (spacer). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Stainless steel anchor and washer. Manufacturer - Robroy, Thomas & Betts, Ocal, Perma-Cote Industries, Kor Kap, or equal.

PART 3 EXECUTION

3.01. INSTALLATION

- A. General
 1. Install products in accordance with manufacturer's instructions.
 2. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit. Anchor conduits to or support from structural members only.
 3. Fasteners used to wall mount any material or equipment weighing 75 lbs or more to concrete or masonry shall be adhesive grouted Type 316 stainless steel anchors. All floor-mounted equipment and other wall-mounted materials or equipment weighing less than 75 lbs may be supported via drilled anchors.
 4. Do not use spring steel clips and clamps.
 5. Do not use powder-actuated anchors.
 6. Do not drill or cut structural members.

7. Install supports in a manner that does not interfere with or weaken the bolts when attaching to structural steel. Obtain the Engineer's written approval of any drilling or cutting on the structure.
8. Through spaces where surface mounting is not available, install multiple conduits on electrical channel rack, either hung or wall mounted. Provide space on each rack for 25 percent additional conduits.
9. All hung systems with conduits 3-inch or larger shall also have lateral seismic supports at each hanger.
10. Support conduit passing through above-grade floors so that sealing sleeves or mechanical link seals do not carry the weight of the conduit.
11. Secure conduit installed in poured-in-place concrete to reinforcing bars with tie wires. Install suitable brackets secured to forms in the absence of reinforcing bars.
12. Install individual surface-mounted conduit with two-piece cast malleable iron clamp assembly.
13. Install surface-mounted cabinets and panelboards with minimum of four or six anchors, depending upon the number of normal anchor points. See table at the end of this section.
14. In wet and damp locations use PVC-coated steel channel supports to stand cabinets, panelboards and mounting panels 1/2-inch (12 mm) off wall.
15. Finish of all supports shall be compatible with the conduit system applicable for the area classification where installed.
16. After thorough investigation of architectural, structural and shop drawings related to work to determine how equipment, fixtures, conduit, panelboards, etc. are to be supported, mounted or suspended, provide:
 - a. Extra steel bolts, inserts, pipe stands, brackets, or any other items required for proper support.
 - b. Supporting accessories where required, whether or not shown on Drawings.
17. Refer to details on the Contract Drawings for free standing and railing mounted construction and for any other details of special conditions. For other situations, the Contractor shall, prior to installation, submit mounting details to the Engineer for approval.
18. Fasteners, brackets and supports shall be fabricated in accordance with Section 05500, Miscellaneous Fabrications, and as specified herein.
19. Coat field cuts of PVC-coated support members with matching PVC material to thickness of system coating. File smooth all cuts prior to coating.

- B. In areas where spray insulation is to be applied, install steel channel standoffs for electrical conduit, boxes and enclosures prior to installation of insulation.

Provide conduit extensions to all boxes and enclosures. Install connecting conduit, boxes and/or enclosures over the installed insulation.

C. Support Applications

1. Unclassified Areas - Galvanized steel channel system or malleable iron clamps.
2. Interior Corrosive Areas - Fiberglass reinforced plastic channel system.
3. Interior Polymer Areas - PVC-coated galvanized steel channel system.
4. Interior Wet Areas - Stainless steel channel system.
5. Hazardous Areas - PVC-coated galvanized steel or stainless steel channel system.
6. Exterior Areas - Stainless steel channel system.

D. Anchor and Fastener Application Schedule - See schedule at end of this section.

E. Support Spacing

1. Metallic Conduit - Not more than 8 feet on center. Types A, A-1, B, E, E-1 within 3 feet of each outlet box, junction box, cabinet or fitting. Type C, within 18 inches of box or fitting. Support boxes, fittings, or cabinets independent of conduit system.
2. Non-Metallic Conduit
 - a. Sizes up through 1-1/4-inches diameter - not more than 3 feet on center.
 - b. Sizes 1-1/2-inches diameter and larger - Not more than 4 feet on center.
 - c. Within 18 inches of each outlet box, junction box, cabinet or fitting.
3. Maximum Deflection
 - a. Metallic Conduit - 1/100th of span between supports.
 - b. PVC Conduit - 1/360th of span between supports.

(continued)

ANCHOR AND FASTENER APPLICATION SCHEDULE

Item Category	Mounting Surfaces				
	Wood, Plywood	Wallboard, Gypsum, FRP, Composition	Hollow Masonry	Solid Masonry	Cast Concrete
Individual Conduit	F	G	D	A	A
Steel/FRP Channel	F, I	D	D	A	A
Structures; i.e., Conduit Rack, Cable Tray	F, I	D	D	A	A
Devices and Equipment Less than 75 lbs.	I	Note 1	D	A	A
Devices and Equipment 75 lbs. or More (Note 4)	I	Note 2	H	B, H	B, C, H
Mounting Panels (Note 3)	I	Note 1	D	B, H	B, C, H
					Note 2
					Note 2
					Note 2

Key to Anchor Types:

- A = Drilled (lead insert in masonry, expansion bolt in concrete)
- B = Adhesive grouted anchor
- C = Cast in place insert
- D = Toggle bolt, hollow wall fastener
- E = Sheet metal screw
- F = Wood screw
- G = Sheet rock screw
- H = Through bolt
- I = Lag screw

In wet, exterior, corrosive, or hazardous areas, all fasteners and anchors shall be Type 316 stainless steel. In all unclassified areas, cadmium-plated fasteners shall be used, except grouted anchors shall be Type 316 stainless steel.

Notes:

- (1) Support via plywood mounting panel lagged to studs or via electrical channel lagged to studs.
- (2) Do not mount to these surfaces.
- (3) Panels mounted to masonry or concrete surfaces shall have 1/2-inch air space between surface and panel via stainless steel spacers.
- (4) Provide two additional support connections; minimum of four or six, depending on number of normal connection points. This requirement may necessitate fabricating the additional connections. Maintain NEMA rating of enclosure.

END OF SECTION

SECTION 16210

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.01. SUMMARY

- A. Section includes arrangement with utility company for permanent electric service; payment of utility company charges for service; service provisions; and utility metering equipment.

1.02. SYSTEM DESCRIPTION

- A. Utility Company - Consolidated Edison Company of New York. Contact: Mr. XXX XXX (914) 925-XXX.
- B. System Characteristics – 480/277 volts, three phase, four wire, 60 Hertz.
- C. Service Entrance - Underground primary from existing utility pole to pad-mount transformer.
- D. Jackson Avenue: 600A, 480/277 volts, three phase, four wire, 60 Hertz

1.03. SUBMITTALS

- A. Submit utility company-prepared drawings. See Division of Responsibility and Service Layout at end of this section.
- B. Submit Engineer-approved shop drawings to utility company for their approval as required.

1.04. QUALITY ASSURANCE

- A. Perform work in accordance with utility company written requirements.
- B. Maintain one copy of each document on site.

1.05. FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on utility company drawings.

1.06. COORDINATION

- A. Coordinate with utility company, relocation of overhead or underground lines interfering with construction. Where power lines are to be temporarily relocated, bill utility costs, directly to Owner.
- B. Contact utility company regarding charges related to service installation. Utility fees to be paid directly by the Owner.

1.07. REGULATORY REQUIREMENTS

- A. Confirm to requirements NFPA 70.
- B. Products - Listed and classified by Underwriters Laboratories, Inc., testing from acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.08. PRE-INSTALLATION MEETING

- A. Convene at least one week prior to commencing work of this section. Review service entrance requirements and details with utility company representative.

PART 2 PRODUCTS

2.01. UTILITY METERS

- A. Furnished by utility company.

2.02. METERING CABINET

- A. Manufacturers - Must be an utility-approved manufacturer.
- B. Size - As required by utility.
- C. Description - Sheet metal cabinet with hinged door conforming to utility company requirements, with provisions for locking and sealing with fused main service disconnect.

2.03. UTILITY TRANSFORMERS

- A. Furnished by utility company to property line. Installation and rigging by Contractor.
- B. Provide transformer pad as required.

2.04. SERVICE ENTRANCE CONDUCTORS

- A. Conductors shall be copper type USE-2/RHW-2 insulation as required by the utility company.
- B. Medium voltage cables shall be #1/0 AL 15 kV per Con Edison specifications.
- C. Provide medium voltage elbows and terminations as required.
- D. Provide limiter lugs for all secondary connection in utility transformer as required by Con Edison.

2.05. SERVICE ENTRANCE CONDUITS

- A. Underground service entrance conduits shall be schedule 40, HDPE conduits as required by the utility company.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify service equipment is ready to be connected and energized.

3.02. EXISTING WORK

- A. Remove exposed abandoned service entrance raceway and conductors, including abandoned components above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
- B. Disconnect abandoned service equipment and remove.
- C. Maintain access to existing service equipment, boxes, metering equipment, and other installations remaining active and requiring access. Modify installation or provide access panel.
- D. Extend existing service installations using materials and methods compatible with existing electrical installations, or as specified.
- E. Clean and repair existing service equipment to remain or to be reinstalled.

3.03. INSTALLATION

- A. Install metering cabinet at height in accordance with utility company requirements. Install drip loop in service conductors.

END OF SECTION

SECTION 16235

PACKAGED ENGINE GENERATOR SYSTEMS – 250 kW DIESEL

PART 1 GENERAL

1.01. WORK INCLUDED

- A. Furnish and install packaged, 250kW, diesel, outdoor generator in sound attenuating enclosure at the Jackson Avenue Pump Stations.

1.02. CODES AND STANDARDS

- A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards:
 - 1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.
 - 2. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
 - 3. NFPA37
 - 4. NFPA70 National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
 - 5. NFPA99 Essential Electrical Systems for Health Care Facilities.
 - 6. NFPA110 Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.
- B. The generator set and supplied accessories shall meet the requirements of the following standards:
 - 1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
 - 2. UL142 B Sub-base Tanks.
 - 3. UL1236 B Battery Chargers.
 - 4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.
- C. The control system for the generator set shall comply with the following requirements.
 - 1. CSA C22.2, No. 14 B M91 Industrial Control Equipment.

2. EN50082-2, Electromagnetic Compatibility B Generic Immunity Requirements, Part 2: Industrial.
 3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
 4. FCC Part 15, Subpart B.
 5. IEC8528 part 4. Control Systems for Generator Sets.
 6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
 7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.
 8. UL1236 B Battery Chargers.
- D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.03. SUBMITTALS

- A. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.
- B. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, microprocessor control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, fuel tank, trailer and radiator.
- C. Prototype Test Reports: Submittals will not be received without submission of prototype test report as specified herein.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.
- F. Alternator data indicating sub transient reactance and temperature rise rating to meet requirements specified herein.

1.04. OPERATION AND MAINTENANCE

- A. Manuals: Furnish four (4) Operation and Maintenance manuals.

- B. Operation & Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.05. QUALITY ASSURANCE

- A. To provide proven reliability of the Generator set, three series of tests shall be performed, no exceptions taken:
 - 1. Prototype model tests
 - 2. Fully assembled factory production model tests
 - 3. Field acceptance tests
- B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and Factory Production tested as described herein shall not be acceptable.
- C. Generator set Prototype Tests: These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submittal for review. The manufacturer=s standard series of components development tests on the generator system, engine and other major components shall be performed and available for review, but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.
- D. Torsiograph Analysis and Test: The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.
- E. Temperature Rise Test: Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured any place in the windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.
- F. Short Circuit Test: A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.
- G. Endurance Run Test: A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer=s standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.

- H. Maximum Power Test: With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of two (2) minutes.
- I. Linear Vibration Test: A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptable criteria.
- J. Cooling System Test: A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (122 °F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge shall be verified by this test.
- K. Maximum Motor Starting KVA Test: Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent on no load voltage with the specified load KVA at near zero power factor applied to the generator set.
- L. Transient Response, Steady State Speed Control and Voltage Regulation Test: Prototype generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.
- M. Witness-Generator Set Factory Production Tests: On the equipment to be shipped, a Five (5) hour test shall be performed at rated load and 0.8 PF. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory test record of the production testing. The equipment supplier at their expense shall coordinate and provide all transportation and lodging for the owner and Owner's engineering representatives, minimum of four to witness the above stated factory test. Tests performed at facilities other than the manufacturer's factory shall not be acceptable.
- N. Factory Test: The unit shall completely assembled and all preliminary adjustments made before the test is initiated. 50 KW genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator, heat exchanger attachments shall not be acceptable.
- O. Testing Procedure:
 - 1. Test diesel-alternator unit at 0.8 PF in the following sequence:
 - a. 0.5 hour at 1/4 load
 - b. 0.5 hours at 1/2 load
 - c. 0.5 hours at 3/4 load
 - d. 2 hours at full load

- P. Above testing shall be strip chart recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:
1. Barometric Pressure
 2. Intake Air Pressure
 3. RPM
 4. Output voltage per phase
 5. Output amperes per phase
 6. Power Factor
 7. KW
 8. Winding temperature
 9. Transient response testing sequence:
 - a. 0-25%, 25%-0
 - b. 0-50%, 50%-0
 - c. 0-75%, 75%-0
 - d. 0-100%, 100%-0
- Q. Above testing shall be strip chart recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.
- R. Field Acceptance Tests: Generator supplier shall provide and conduct a two (2) hour load bank test at unity power factor for the generator set. Contractor must provide portable load bank for testing generator set at 100% load. Load bank test shall test each generator at full nameplate KW ratings. Generator manufacturer's representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the engineer for final acceptance. No handwritten field notes will be allowed.
- S. Initial start up and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment. Contractor responsible for protection of testing equipment and any additional cable, etc., required if equipment cannot be located internally during testing.
- T. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every fifteen (15) minutes.

1.06. QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience, and with an authorized distributor offering 24 hour parts and service availability within 50 miles of the project. Proposed engine/generator combination shall have been in production a minimum of five (5) years.
- B. Supplier: Authorized distributor of specified manufacturer with minimum five (5) years documented experience with specified products and factory-trained service technicians.

1.07. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.
- B. Furnish Products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.08. PRE-INSTALLATION CONFERENCE

- A. Convene one (1) week prior to commencing work of this Section.

1.09. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site.
- B. Accept unit on site mounted on trailer. Inspect for damage. Provide written verification that Genset tested and Genset received are one and the same.
- C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic during construction.

1.10. EXTRA MATERIALS

- A. Provide two (2) of each fuel, oil and air filter element, engine belts and hoses.

1.11. WARRANTY

- A. A no deductible comprehensive warranty shall be provided for all products against defects in materials and workmanship for a five-year or 1500 hour period from the start-up date. Warranty shall cover all costs of covered repairs, including travel expenses.

1.12. SERVICE AGREEMENT

- A. Manufacturer shall provide Owner with a One (1) year service agreement that includes changing all fluids and filters once a year and a minor inspection six (6) months after each change.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. Approved manufacturer:

1. Cummins Power Generation, model DQDAA rated for STANDBY POWER with HCI434F Frame Alternator as distributed by Cummins Sales & Service. 890 Zerega Avenue, Bronx, NY 10473. Contact Ed Cheung: 718-892-2400, ext. 217.

B. It is intended that all products specified herein be of standard ratings, therefore, the KW and KVA, starting KVA and maximum allowable voltage dip, ratings, etc., shall be the manufacturer's next size or rating to exactly meet the specifications. No exceptions.

2.02. DIESEL ENGINE-GENERATOR SET

A. Ratings

1. The generator set shall operate at 1800 rpm and at a voltage of: 480 Volts AC, 3-phase, 4-wire, 60 hertz.
2. The generator set shall be rated at 250 kW, 312.5 kVA at 0.8 PF, standby rating, based on site conditions of: Altitude 1,000 ft., ambient temperatures up to 122 degrees F (50 degrees C).

B. Performance

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.
3. The diesel engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
4. Motor starting capability shall be a minimum of 1372 kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.

6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.
2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver- or tin-plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.
2. Power connections to auxiliary devices shall be made at the devices, with required protection located at a wall-mounted common distribution panel if walk-in enclosure.
3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

2.03. ENGINE AND ENGINE EQUIPMENT

- A. The engine shall be diesel, minimum EPA TIER 3, 4 cycle, radiator and fan cooled. Minimum displacement shall be 543 cubic inches. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable.
- B. A digital electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.
- C. Skid-mounted radiator and cooling system rated for full load operation in 122 degrees F (50 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H₂O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment

manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental Electric starter(s) capable of three complete cranking cycles without overheating.

2.04. ENGINE ACCESSORY EQUIPMENT

A. The engine for the generator shall include the following accessories:

1. Positive displacement, contact.
2. Mechanical, full pressure, lubrication oil pump.
3. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
4. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.
5. Replaceable dry element air cleaner with restriction indicator.
6. Flexible supply and return fuel lines.
7. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

B. Coolant heater

1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.
2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.
3. The coolant heater shall be provided with a 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.
4. The coolant heater(s) shall be 208/240V, 2000 watts and sized as recommended by the engine manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

- C. Provide vibration isolators, internal pad type, quantity as recommended by the generator set manufacturer.
- D. Starting and Control Batteries shall be calcium/lead antimony type, 12 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.
- E. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade installed inside enclosure.
- F. A UL listed/CSA certified 6 amp voltage regulated battery charger shall be provided for each engine-generator set. The charger shall be located inside the automatic transfer switch. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings.
- G. Provide Alternator Anti-Condensation heater – 120 VAC, 100W.
- H. Provide Engine Oil heater – 120 VAC, 150W.

2.05. AC ALTERNATOR

- A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single pre-lubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system and shall be UL1446 listed. Actual temperature rise measured by resistance method at full load shall not exceed 80 degrees Centigrade.
- B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.
- C. The subtransient reactance of the alternator shall not exceed 7.0 percent, based on the 80°C rise rating.
- D. Alternator shall be rated for a minimum of 320 KW at 80°C, 480/277 VAC standby.

2.06. ENGINE GENERATOR SET CONTROL

- A. Generator set Control. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.
- B. The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

C. Control Switches

1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
2. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
3. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
4. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

D. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

1. Digital metering set, .5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.
2. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.
3. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.
4. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

E. Generator Set Alarm and Status Display.

1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

- a. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).
 - b. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
 - c. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
 - d. The control shall include an amber common warning indication lamp.
2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:
 - a. Low oil pressure (warning)
 - b. Low oil pressure (shutdown)
 - c. Oil pressure sender failure (warning)
 - d. Low coolant temperature (warning)
 - e. High coolant temperature (warning)
 - f. High coolant temperature (shutdown)
 - g. High oil temperature (warning)
 - h. Engine temperature sender failure (warning)
 - i. Low coolant level (warning)
 - j. Fail to crank (shutdown)
 - k. Fail to start/overcrank (shutdown)
 - l. Overspeed (shutdown)
 - m. Low DC voltage (warning)
 - n. High DC voltage (warning)
 - o. Weak Battery (Warning)
 - p. Low fuel-daytank (warning)
 - q. High AC voltage (shutdown)
 - r. Low AC voltage (shutdown)

- s. Under frequency (shutdown)
 - t. Over current (warning)
 - u. Over current (shutdown)
 - v. Short circuit (shutdown)
 - w. Ground fault (warning) (optional--when required by code or specified)
 - x. Over load (warning)
 - y. Emergency stop (shutdown)
 - z. (4) configurable conditions
3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

F. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control
 - a. Engine oil pressure (psi or kPA)
 - b. Engine coolant temperature (degrees F or C)
 - c. Engine oil temperature (degrees F or C)
 - d. Engine speed (rpm)
 - e. Number of hours of operation (hours)
 - f. Number of start attempts
 - g. Battery voltage (DC volts)
2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.
3. Provide and install a 20-light LED type remote alarm annunciator with horn, located as shown on the Drawings or in a location that can be conveniently monitored by facility personnel. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 1 systems for the local generator control panel. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided. Alarm silence and

lamp test switch(es) shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel.

The annunciator shall include the following alarm labels, audible annunciation features, and lamp colors:

Condition	Lamp Color	Audible Alarm
Genset Supplying Load	Amber	No
Charger AC Failure	Amber	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Red	Yes
Check Genset	Amber	No
Not In Auto	Red	Yes
Genset Running	Amber	No
High Battery Voltage	Amber	Yes
Low Battery Voltage	Red	Yes
Weak Battery	Red	Yes
Fail to Start	Red	Yes
Low Coolant Temperature	Red	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Red	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
(4) Spares	Configurable	Configurable

2.07. ENGINE CONTROL FUNCTIONS

- A. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
- B. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled. Total duration of operating time in the idle mode shall be controlled by the system, to prevent degradation of the engine capabilities due to excess operating time at idle.
- C. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.

- D. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
- E. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

2.08. ALTERNATOR CONTROL FUNCTIONS

- A. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.
- B. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.
- C. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.
- D. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.
- E. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

2.09. OTHER CONTROL FUNCTIONS

- A. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.

2.10. GENERATOR MAIN LINE CIRCUIT BREAKERS & ADDITIONAL PROTECTION

- A. The generator set shall be provided with genset mounted, quantity two (2) 600 amp main line circuit breakers. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. Electronic trip unit shall include adjustable long-time, short-time and instantaneous trip settings. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.
- B. The generator set shall be provided with a utility grade protective relay, designed to provide thermal overload protection for the alternator, and performance certified for that purpose by a 3rd party testing organization. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided. Relay shall be installed to allow shutdown of the generator excitation system on an alternator overload condition, with the engine operating for a cool-down period before shutdown. The relay shall not include an instantaneous trip function

2.11. SUBBASE FUEL TANK

- A. Provide a sub-base nominal 500 gallons fuel tank for the generator set. The sub-base fuel tank shall not exceed 222" L x 82". Installation shall be in compliance to NFPA 37. The fuel tank shall be a double-walled, steel construction and include the following features:
 - 1. Normal and emergency tank vent piped above enclosure roof line.
 - 2. Internal 5 gallon fuel fill port containment.
 - 3. Mechanical level gauge.
 - 4. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by the engine manufacturer and in compliance to UL2200 and NFPA 37 requirements.
 - 5. Leak detection provisions wired to the generator set control for local and remote alarm indication.
 - 6. Low level float switches to indicate fuel level set to 40%. Wire switches to generator control for local and remote indication of fuel level.

7. Basin drain.
8. Integral lifting provisions.
9. Provide over fill prevention valve to stop fuel flow at 95% of tank capacity.
10. Provide fuel fill with spill containment.
11. Provide high level visual and audible alarm panel when tank level is at 90% capacity.

2.12. OUTDOOR SOUND ENCLOSURE (CUMMINS F202 DESIGN – Level 2)

A. Construction:

1. Steel - UL2200 listed Sound Attenuated, Weatherproof Genset Enclosure
 - a. Package shall comply with the requirements of the NEC for all wiring materials and components.
 - b. Sound attenuation rating of 71.4 dBA @ 7m.
 - c. The enclosure shall be designed in which allows generator set to operate at full rated load in an ambient temperature of up to 122 F.
- B. The enclosure will consist of a cambered roof, two sidewalls, two end walls, and a nominal 500 Gallon fuel tank base, incorporating pre-painted steel construction and application-specific non-hydroscopic acoustic insulation, air handling equipment designed to provide the specified level of sound attenuation.
- C. The enclosure shall include a 50A, 120/208V (240V), single phase, 3-wire loadcenter. All generator accessories requiring power shall be prewired to the load center. This includes, but is not limited to: motorized dampers, block heaters, battery chargers, lights, receptacles, etc.
- D. Exhaust silencer shall be installed inside enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with rain cap.
- E. The enclosure shall include flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure with internal drain valves.
- F. External radiator fill provision must be provided.
- G. Doors shall be recessed, lockable with retainers to hold doors open for easy access.

PART 3 EXECUTION

3.01. ACCEPTANCE

- A. Equipment shall be initially started and operated by representatives of the manufacturer.
- B. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.
- C. Contractor shall provide all fuel for testing and fill fuel tank complete prior to turnover to Owner.

3.02. TRAINING

- A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than two (2) four (4) hours sessions in duration and the class size shall be limited to five (5) persons. Training date shall be coordinated with the facility owner.

3.03. DEMONSTRATION

- A. Provide systems demonstration. Electric Contractor shall provide fuel for testing and shall fill tank complete after all testing is done and before turning over to Owner.
- B. Describe loads connected to standby system and restrictions for future load additions.
- C. Simulate power outage by interrupting normal source and demonstrate that system operates to provide standby power.

END OF SECTION

SECTION 16413

ENCLOSED TRANSFER SWITCHES

PART 1 GENERAL

1.01. SUMMARY

- A. Provide automatic transfer switches, manual/non-automatic transfer switches and portable generator cam-lock boxes as shown on the drawings. Automatic transfer switches shall be delayed-transition type.

1.02. REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- C. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies.
- D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- E. UL 891 - According to this UL Standard, the equipment shall be labeled: "Suitable for use only as service equipment."
- F. UL 1008 - Standard for Transfer Switch Equipment

1.03. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 20 years' documented experience and with service facilities within 50 miles of the project.
- B. Supplier - Authorized distributor of specified manufacturer with minimum 10 years' documented experience.

1.04. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure and finish.

1.05. FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.06. MAINTENANCE SERVICE

- A. Furnish service and maintenance of transfer switch for one year from date of Substantial Completion.

1.07. MAINTENANCE MATERIALS

- A. Provide two of each special tool required for maintenance.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. ASCO, Model 7000 Series 7NTS (design basis, non-automatic transfer switches).
- B. ASCO, Model 7000 Series 7ADTS (design basis, automatic transfer switches).

2.02. AUTOMATIC TRANSFER SWITCH

- A. Description - NEMA ICS 10, automatic transfer switch (ATS).
- B. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted.
- C. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
- D. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.
- E. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.
- F. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.
- G. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

- H. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor terminal plate with fully-rated AL-CU pressure connectors shall be provided.

2.03. SERVICE CONDITIONS

- A. Service Conditions - NEMA ICS.
- B. Temperature - 105 degrees F.
- C. Altitude - 100 feet.

2.04. RATINGS

- A. Voltage – 480/277 volts, 3 phase, 4 wire, 60 Hertz.
- B. Switched Poles - Three.
- C. Load Inrush Rating - Combination load.
- D. Continuous Rating – 600 amperes, or as shown on the drawings.
- E. Interrupting Capacity - 100 percent of continuous rating.
- F. Withstand Current Rating - The ATS/MTS shall be rated to close on and withstand the available rms symmetrical short circuit current at the ATS/MTS terminals with the type of overcurrent protection shown on the plans.

2.05. PRODUCT OPTIONS AND FEATURES

- A. Indicating Light Emitting Diode Lights - Mount in cover of enclosure, one to indicate when the ATS/MTS is connected to normal source (green), one to indicate when the ATS/MTS is connected to emergency source (red), one to indicate when the normal source is available (green), and one to indicate when the emergency source is available (red).
- B. Emergency Switch - Mount in cover of enclosure to initiate manual transfer to emergency source.
- C. Normal Switch - Mount in cover of enclosure to initiate manual transfer to normal source.
- D. Transfer Switch Auxiliary Contacts - Contacts rated 10 amps, 480VAC shall be provided consisting of one contact, closed when the ATS is connected to normal source and one contact closed, when the ATS is connected to emergency source.
- E. Automatic transfer switches shall include a keyed selector switch to select starting the permanent stationary generator or a portable generator. Accessory 6GK.
- F. Normal Source Monitor - The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85 to 100 percent and dropout adjustable from 75 to 98 percent of pickup setting.

- G. Alternate Source Monitor - Single-phase voltage sensing of the emergency source shall be provided, with a pickup voltage adjustable from 85 to 100 percent and frequency sensing with pickup adjustable from 90 to 100 percent.
- H. In-phase monitor.
- I. Solid neutral.

2.06. AUTOMATIC SEQUENCE OF OPERATION

- A. Initiate Time Delay to Start Alternate Source Engine Generator: Upon initiation by normal source monitor.
- B. Time Delay To Start Alternate Source Engine Generator: 0 to 6 seconds, adjustable.
- C. Initiate Transfer Load to Alternate Source: Upon initiation by normal source monitor and permission by alternate source monitor.
- D. Time Delay Before Transfer to Alternate Power Source: 0 to 5 minutes adjustable.
- E. Initiate Retransfer Load to Normal Source: Upon permission by normal source monitor.
- F. Time Delay Before Transfer to Normal Power: 0 to 30 minutes, adjustable; bypass time delay in event of alternate source failure.
- G. Time Delay Before Engine Shut Down: 0 to 60 minutes, adjustable, of unloaded operation.
- H. Repetitive accuracy of all settings shall be +/- 2% or better over an operating temperature range of -20°C to 70°C. Voltage and frequency settings shall be fully field adjustable in 1% increments over the whole range without the use of tools, meters or power supplies.
- I. Delayed transition time delay - 0 to 5 minutes.

2.07. ENCLOSURE

- A. Enclosure - ICS 6, NEMA Type 1.

2.08. PORTABLE GENERATOR CAM-LOCK BOX

- A. Portable generator cam-lock box shall be as manufactured by ESL Power Systems, TempTap – Generator Docking Station with breakers series 4600.
- B. Enclosure – NEMA Type 3RX, stainless steel, powder-coated ANSI Grey.
- C. Circuit Breaker – sizes as shown on the drawings, 3-pole, thermal magnetic type disconnect.
- D. Color-coded cam style male inlets, 600A rated, arranged for 480/277V, 3Ø, 4-wire service.
- E. UL 1008 listed.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that surface is suitable for transfer switch installation.

3.02. INSTALLATION

- A. Install transfer switches in accordance with manufacturer's instructions.
- B. Provide engraved plastic nameplates under the provisions of Section 26 05 00, Electrical Work.

3.03. MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems.

3.04. DEMONSTRATION

- A. Demonstrate operation of transfer switch in normal and emergency modes.

3.05. TESTS AND CERTIFICATION

- A. The manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
- B. The manufacturer shall be certified to the ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

3.06. SERVICE REPRESENTATION

- A. The ATS/MTS manufacturer shall maintain a local service center within a 50-mile radius of the job location. The service center's personnel must be factory trained and must be on call 24 hours per day, 365 days per year.

The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

END OF SECTION

SECTION 16475

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Circuit breakers below 600 volts.
- B. Fuses below 600 volts.
- C. Spare fuse cabinet.

1.02. REFERENCES

NECA (National Electrical Contractors Association) "Standard of Installation"	
NEMA AB 1	Molded Case Circuit Breakers
NFPA 70	National Electrical Code
NEMA FU 1	Low Voltage Cartridge Fuses

1.03. SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Product Data - Provide catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.
- C. Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- D. Samples as requested by the Engineer.

1.04. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Circuit Breakers - Conform to requirements of NEMA AB-1 and UL 489.
- C. Furnish products listed and classified by UL or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.05. EXTRA MATERIALS

- A. Furnish under provisions of Section 01700, Contract Closeout.
- B. Provide three of each size and type current limiter.

- C. Contractor to provide separate NEMA 12 enclosure and shall provide spare fuses for each type used, as follows:

- 1. Power distribution fuses above 200 amps - One set.
- 2. All others - Two sets.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Circuit Breakers

- 1. Square D
- 2. Siemens
- 3. ABB
- 4. Or approved equal.

- B. Main Fuses, Unless Otherwise Noted

- 1. Bussman - Model CPN-RK
- 2. Gould-Shawmut - Model A2K

- C. Motor and Device Fuses, Unless Otherwise Noted

- 1. Bussman - Model RU5
- 2. Gould-Shawmut - Model TRI-ONIC

2.02. GENERAL REQUIREMENTS

- A. Circuit breakers shall be of the molded case type.
- B. Shall consist of the number of poles, ampere rating, and interrupting rating as shown or specified.
- C. Molded case circuit breakers shall have overcenter toggle-type mechanism, providing quick-make, quick-break action. Mechanism shall be mechanically trip-free from the handle so the contacts cannot be held closed against short circuit currents.
- D. Multiple pole breakers shall be common trip type.
- E. On and Off positions shall be clearly marked and color coded.
- F. All breakers in panels for switching duty shall be "SWD" or "T" rated, for switching duty.

- G. Breakers 250 ampere frame and larger shall have interchangeable trip.
- H. All main service breakers shall have 100 percent ampere rating and shall be service entrance rated.
- I. Breakers over 100-ampere frame size shall have front adjustable magnetic trip elements to provide instantaneous tripping over a range of 400 to 1000 percent of the continuous ampere trip rating.
- J. All breakers shall be of the bolt-on type.
- K. Dimensions and Performance - NEMA FU 1, Class as specified or indicated.
- L. Voltage - Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.

2.03. CONTACTS

- A. Contacts shall be non-welding under rated operating conditions.
- B. Silver-to-silver type.
- C. Provide with suitable arc interrupting devices.

2.04. TERMINATIONS

- A. Circuit breakers shall have lugs that accommodate wire sizes shown on the Contract Drawings, including additional lugs where shown or required.
- B. Lugs shall be UL listed for copper conductors only.
- C. Breakers shall be UL listed for mechanical-type lugs.

2.05. GROUND FAULT PROTECTION

- A. 250-ampere frame circuit breakers or less.
 - 1. Integral with circuit breaker.
 - 2. Push to test.
 - 3. Reset feature.
 - 4. Trip indication.
 - 5. 0.8-second maximum pickup time.

2.06. RATINGS

- A. All circuit breakers shall meet or exceed the following unless otherwise noted on the Contract Drawings or in the specifications.

Frame Size Maximum Constant Current - AMPS	NEMA* Interrupting Cap. Symmetrical-AMPS	Poles	Maximum Voltage Rating
100	10,000 @ 120 volts	1	120
100	10,000 @ 240 volts	2,3	240
100	18,000 @ 480/277 volts	1	480
100	18,000	2,3	600
250 Branch	25,000	2,3	600
250 Main	35,000	2,3	600
400 Branch	30,000	2,3	600
400 Main	35,000	2,3	600
1000 Branch	30,000	2,3	600
1000 Main	65,000	2,3	600
1200	100,000	2,3	600
2000	100,000	2,3	600

*Interrupt ratings are at 480 volts unless noted otherwise.

2.07. BREAKER TRIP CHARACTERISTICS

All breakers shall be Type A thermal magnetic type unless noted otherwise on the Contract Drawings or specified.

A. Thermal Magnetic Type (Type A)

1. Long time, nonadjustable, thermal overload, trip.
2. Instantaneous, electromagnetic trip.
3. Ambient compensating.
4. "Push-to-trip" test button.

B. Integral Magnetic and Solid State Trip Type (Type B)

1. Provide solid-state logic programmer.
2. Long delay, range adjustable trip.
3. Magnetic pick up, range and time adjustable, trip.
4. Integral power supply.
5. 100 percent equipment rated.
6. Integral ground fault protection where noted on the Contract Drawings or specified.

7. Ground fault system neutral current transformer for each breaker equipped for ground fault.
8. "Push-to-trip" pushbutton.
9. Adjustable rating plug type.

C. Integral Solid State Trip Type (Type C)

1. Solid state logic programmer.
2. Long delay, range and time adjustable, trip.
3. Short delay, range and time adjustable, trip where noted.
4. Instantaneous, range adjustable, trip unless noted otherwise for specific breakers.
5. Ground fault, range and time adjustable, trip where noted.
6. Neutral sensor for each breaker equipped with ground fault on three phase, four wire, enclosed breakers, panels and switchboards.
7. 100 percent equipment rated.
8. Integral power supply.
9. "Push to Trip" button.
10. Sensor ratings 200-1200 ampere.
11. Provide trip targets for overload, short circuit and ground fault for breakers as noted on Contract Documents:

D. Motor Circuit Protectors (Type MCP)

1. Each pole shall provide instantaneous short circuit protection.
2. MCP shall have provisions for adjusting the instantaneous magnetic trip element.
3. All poles shall be constructed to open, close, and trip simultaneously.
4. The MCP mechanism shall be the transient inrush suppressor type appropriate for the protection of energy efficient motors.

2.08. CURRENT LIMITERS

- A. Current Limiter - Designed for application with molded case circuit breaker.
- B. Coordinate limiter size with trip rating of circuit breaker to prevent nuisance tripping and to achieve interrupting current rating specified for circuit breaker.

- C. Provide interlocks to trip circuit breaker and to prevent closing circuit breaker when limiter compartment cover is removed or when one or more limiter is not in place or has operated.

2.09. FUSES

- A. Main Service Switches - Class RK (time delay).
- B. Motor Load Feeder Switches - Class RK (time delay).
- C. Other Feeder Switches - Class RK (time delay).
- D. Power Branch Circuits - Class RK (time delay).
- E. Motor Branch Circuits - Class RK (time delay).
- F. Lighting Branch Circuits - Class G.

PART 3 EXECUTION

3.01. GENERAL

- A. Circuit breaker trip ratings and fuse sizings shown on the Contract Drawings are maximum for the specific application.
- B. Breakers shall be removable from the front of the panel or board without disturbing adjacent units.
- C. All breakers and fuses shall be suitably mounted in an enclosure in accordance with Section 16161, Control Panels and Enclosures, and supported in accordance with Section 16191, Electrical Supports, Anchors and Fasteners.
- D. Individual-mounted circuit breakers and fused switches shall be provided with NEMA enclosures and installed at locations shown on Drawings and as required by National Electrical Code (NEC) at approximately 60 inches from floor to top of enclosure.
- E. Fuses shall be of the rejection type unless otherwise shown or specified.
- F. Install spare fuse enclosure where indicated by Owner.

3.02. HANDLE OPERATORS

- A. All enclosures for individually-mounted circuit breakers or fuses shall have enclosure-mounted handle operators, operating through approximately 180-degree arc. Flush mounted circular rotating handle operators are unacceptable.

3.03. DISCONNECTING MEANS - LOCKING

- A. For separately-mounted exterior circuit breakers, safety and disconnect switches, provide locking-type handles to be locked in both the On (closed) or Off (open) positions.

3.04. IDENTIFICATION

- A. Circuit breakers shall be provided with uniformly designed nameplates to clearly indicate the type, rating, listing/recognition/certification marks, and other information as defined in UL 489 in accordance with Section 16055, Electrical Work.

3.05. TERMINALS

- A. All terminals shall comply with UL 486A and B and CSA 1165 Standards. Torque markings shall be provided and followed per UL 489.
- B. Terminals shall be amply sized, including adapters or special lugs to connect the conductor(s) as shown, specified or required.

3.06. RATINGS - FUSES

- A. Main distribution fuses shall be sized as shown on the Contract Drawings.
- B. Motor and device fuses shall be sized as per the manufacturer's requirements in accordance with the NEC.

3.07. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Inspect each circuit breaker visually, per NETA ATS-1995.
- C. Perform several mechanical On-Off operations on each circuit breaker.
- D. Verify circuit continuity on each pole in closed position.
- E. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB-1 requirements.
- F. Include description of testing and results in test report.

3.08. ADJUSTING

- A. Adjust work under provisions of Section 01700, Contract Closeout.
- B. Adjust trip settings so that circuit breakers coordinate with other overcurrent protective devices in circuit.
- C. Adjust trip settings to provide adequate protection from overcurrent and fault currents.

END OF SECTION

SECTION 16484

CONTACTORS AND MOTOR STARTING EQUIPMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Manual motor starters and switches.
- B. Motor starters.
- C. Magnetic contactors.

1.02. REFERENCES

- A. UL listing is required for all factory-fabricated assemblies. Individual component listing is also required.
- B. Size equipment per NEMA and UL standards to match motor or equipment controlled.
- C. The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this specification to the extent indicated by the references thereto. The issue in effect at time of construction shall be applicable. In text, such specifications and standards are referred to by basic designation only.
 - 1. National Electric Code (NEC).
 - 2. Underwriters Laboratories, Inc. (UL) - UL-508.
 - 3. National Electrical Manufacturers Association (NEMA)
 - a. NEMA-1C-1
 - b. NEMA AB-1 - Molded Case Circuit Breakers
 - 4. American National Standards Institute (ANSI).
 - 5. J.I.C. Standards for Industrial Control.

1.03. SUBMITTALS

- A. Submittals shall be made in accordance with Sections 01300, Submittals, and 16055, Electrical Work.
- B. Shop drawings shall be submitted for all starters and contactors. The submittal shall contain all the information needed to prove conformance with these specifications.
- C. Submit elementaries and block diagrams for systems of relays and/or contactors.

- D. Samples shall be submitted as may be requested by the Engineer.

1.04. QUALITY ASSURANCE

- A. Perform work in accordance with NECA Standard of Installation.

1.05. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 10 years' documented experience.

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or a testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.01. GENERAL

- A. All equipment furnished shall be of one approved manufacturer where possible. Manufacturers are General Electric Company, Square D Company, Cutler-Hammer, or equal.
- B. For control panels with motors less than 1/2 HP, starters may be IEC rated motor protective switches. All other starters shall be NEMA rated starters.
- C. Construction
 - 1. Parts easily removable when subject to wear, arcing damage, or electrical failure.
 - 2. Enclosures - Cold rolled, formed seam-welded steel or cast aluminum with suitable legend plates and NEMA enclosures as per Section 16161, Control Panels and Enclosures.
 - 3. Overload Protection
 - a. Magnetic Starters
 - 1) Melting Alloy or Bi-metal - For all motors including those with internal protection, of proper size to match the controller. One sensing device per ungrounded motor lead. Exception: Windings used only during motor starting and automatically disconnected when the motor is running may be unprotected. Units shall be "standard," "slow," or "fast" response as required for the type motor and load per the suppliers' recommendations. Size heaters per manufacturer's table supplied with the starter for the actual motor full load current and enclosure indicated on the motor

nameplates. Temperature compensating motor starter overloads where or when required.

- 2) Solid State - Overload relay, self powered, current sensing, phase unbalance and phase loss protection, NC standard trip contacts, visible trip indication, trip test function, power LED. Provide auxiliary NO contact (convertible to NC). Adjust solid state overload settings to match motor manufacturers nameplate motor data.
Manufacturers - Square D, Allen-Bradley, or equal.
- b. Manual Starters - Thermal overloads in each phase leg or one for each motor winding. Use Type A for fractional horsepower and Type B for integral horsepower applications.
4. Auxiliary Contacts - Rated as required by interlocking and/or automatic control systems as indicated in these specifications and/or on the Contract Drawings. Minimum 2 NO and 2 NC auxiliary contacts required.

2.02. MANUAL STARTERS

A. General

1. Contact Mechanism - Quick make, quick break toggle action.
2. Contactors - Silver alloy.
3. Enclosures - Adequately sized to contain the starter and all accessories and/or modification. NEMA classification to meet requirements of Section 16161, Control Panels and Enclosures.

B. Fractional HP Type

1. Two-pole (unless shown or specified otherwise).
2. Toggle operated (unless shown or specified otherwise).
3. Full voltage.
4. Shall be non-reversing, reversing or two-speed as shown or specified.
5. Thermal overload device for each phase or motor winding.
6. Lock-off provisions and neon pilot light.
7. Selector switch as required, labeled for function performed.
8. General Electric Class CR101; Square D Class 2510, 2511, 2512 Type F; Cutler-Hammer Type B330AN; or equal.

C. Integral HP Type

1. Two- or three-pole polyphase.
2. Thermal overload device for each phase.
3. Full voltage, non-reversing, reversing or two-speed as shown or specified.
4. Pushbutton operated with handle guard and lockoff.
5. Neon pilot light(s).
6. Auxiliary contacts as required.
7. Low voltage protection to trip unit on power outage when shown or specified.
8. General Electric Class CR1062; Square D Class 2510, 2511, 2512 Type M; Cutler-Hammer Type B100; or equal.

2.03. MANUAL STARTING SWITCHES

A. General

1. Quick make, quick break toggle action.
2. Contacts - Silver alloy.
3. Enclosures - Adequately sized to contain the starter and all accessories and/or modifications. NEMA classification to meet requirements of Section 16161, Control Panels and Enclosures.

B. Switches

1. Two- or three-pole as shown or required.
2. Toggle operated.
3. Full voltage.
4. Shall be non-reversing, reversing, two-speed as shown or specified.
5. Lock-off provisions and neon pilot light where shown or required.
6. Starting switches labeled for function performed.
7. Square D Class 2510, 2511, 2512, Type K; Cutler-Hammer Type MS; or equal.

2.04. MAGNETIC STARTERS

A. General

1. Size per NEMA and UL standard to match motor controlled. Exceptions: NEMA Size 1 minimum (except NEMA Size 0 may be used for ventilation equipment 2 HP and less and in a separate H&V control panel) or as shown otherwise.
2. Starter coil voltage shall be 120 VAC unless noted otherwise.
3. Provide auxiliary contacts as required.
4. Provide with melting alloy thermal overloads.

B. Full Voltage Non-Reversing Starting (FVNR)

1. Across-the-line type, rated 600 volts maximum.
2. Equipped with double break silver alloy contacts. (Single break shall be supplied on Size 8.)
3. Straight-through wiring.
4. Coils - Of molded construction through NEMA Size 7. Coils on Size 8 starters shall be form wound, taped, varnished and baked. Replaceable from the front without removing the starter from the panel.
5. Suitable for the addition of at least four auxiliary contacts.
6. Cutler-Hammer Type AN16, Square D Class 8536, General Electric, or equal.

2.05. COMBINATION MAGNETIC STARTERS

- A. Factory assembled of UL-listed components within a single enclosure containing MCP, magnetic starter, CPT, overloads, and pilot devices as called for.
- B. Handle mechanism permanently connected to switch (operating through approximately a 180-degree arc) and installed in body of enclosure with interlock to prevent unauthorized opening or closing of door with switch on.
- C. Provision for padlocking disconnect handle in off position.
- D. Disconnect handle having clear indication of switch(es) position.
- E. Auxiliary switches where indicated on Contract Drawings.
- F. Magnetic starter, auxiliary controls and motor circuit protector as specified.

2.06. MAGNETIC CONTACTORS

A. General

1. Power and lighting contactors of the voltage, current rating, and number of poles as indicated on the Contract Drawings.
2. Continuously rated for all types of ballast and tungsten lighting, resistive and motor loads.
3. Totally enclosed, double break, silver-cadmium-oxide power type.
4. Auxiliary arcing contacts are not acceptable.
5. Auxiliary contacts and control circuit fusing as indicated on the Contract Drawings.
6. Industrial duty rated for 600-volt operation.

B. Electrically-Held Contactor Coils - Continuously rated and encapsulated.

C. Mechanically-Held Contactors - Coil-clearing contacts supplied so that the contactor coil shall be energized only during the instance of operation. Both the latching and unlatching coils shall be encapsulated.

D. Manufacturers

1. Mechanically Held Over 200 Amps - Square D Class 8903, ASCO Bulletin 911, or equal.
2. Electrically Held Over 200 Amps - ASCO Bulletin 1035, Square D Class 8903 Type S, or equal.
3. Mechanically Held 20-200 Amps - ASCO Bulletin 920, Square D Class 8903 Type S, or equal.
4. Electrically Held 20-200 Amps - Square D Class 8903, ASCO Bulletin 1035, or equal.
5. Multipole Lighting Contractors, 20 Amp - Square D Class 8903 Type L, ASCO Bulletin 917, or equal.

2.07. RELAYS (0-25 AMPS)

A. See Section 16900, Auxiliary Controls and Relays.

2.08. INTRINSICALLY-SAFE BARRIERS

A. See Section 16900, Auxiliary Controls and Relays.

2.09. REDUCED VOLTAGE STARTERS

- A. Factory assembled of UL-listed components within a single enclosure containing MCP or circuit breaker, solid-state reduced voltage motor starter, CPT, overloads, controls, relays and pilot devices as called for.
- B. Provide full-voltage bypass starters where shown on the drawings.
- C. Handle mechanism permanently connected to switch (operating through approximately a 180-degree arc) and installed in body of enclosure with interlock to prevent unauthorized opening or closing of door with switch on.
- D. Provision for padlocking disconnect handle in off position.
- E. Disconnect handle having clear indication of switch(es) position.
- F. Auxiliary switches where indicated on Contract Drawings.
- G. Enclosed controller shall include a six thyristor ((SCR) solid-state power configuration with integrated shorting contactor.
- H. Horsepower, voltage and ratings shall be as indicated on the Drawings.
- I. Enclosure shall be NEMA ICS type 4X stainless steel.
- J. Manufacturer - ABB, PSTX series basis of design.

PART 3 EXECUTION

3.01. GENERAL

- A. Install according to the requirements of the NEC and as shown or noted on the Contact Documents.
- B. Mount all contactors in an enclosure as individual units or in a control panel as part of a control system.
- C. Enclosures and control panels to comply with Section 16161, Control Panels and Enclosures.

3.02. INDIVIDUAL RELAY OR CONTACTOR ENCLOSURES

- A. Wall mount unless noted or shown otherwise.
- B. Mounting Height - Approximately 60 inches to enclosure top from finished floor.
- C. NEMA enclosure for area of mounting, per Section 16161, Control Panels and Enclosures.

3.03. ENCLOSED STARTER MOUNTING

- A. Height - Per Section 16161, Control Panels and Enclosures.
- B. Methods and Material - Per Section 16191, Electrical Supports, Anchors and Fasteners, and manufacturer's requirements.

END OF SECTION

SECTION 16900

AUXILIARY CONTROLS AND RELAYS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Pushbutton.
- B. Selector switches.
- C. Indicating pilot lights.
- D. Contact blocks.
- E. Control power transformers.
- F. Fuse blocks.
- G. Limit switches.
- H. Time delay relays.
- I. Relays.
- J. Intrinsically safe barriers.
- K. Liquid level sensors (floats).
- L. Door Contacts.
- M. Smoke Detectors.

1.02. REFERENCES

NEMA ICS 1	General Standards for Industrial Control Systems
NEMA ICS 2	Standards for Industrial Control Devices, Controllers and Assemblies
NEMA ICS 6	Enclosures for Industrial Controls and Systems
NEMA ST 1	Standard for Specialty Transformers (Except General Purpose Type)

1.03. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300, Submittals.
- B. Submit shop drawings to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.
- C. Submit product data under provisions of Section 01300, Submittals.

- D. Submit product data for each component specified. The submittal shall be included as part of the system in which the component is specified.
- E. Submit manufacturer's installation instructions under provisions of Section 01300, Submittals.
- F. Submit samples as requested by the Engineer.

1.04. PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01700, Contract Closeout.
- B. Accurately record actual locations of control equipment. Revise diagrams included in Drawings to reflect actual control device connections.

1.05. OPERATION AND MAINTENANCE DATA

- A. Submit operation data under provisions of Section 01700, Contract Closeout.
- B. Include instructions for adjusting and resetting time delay relays, timers, and counters.
- C. Submit maintenance data under provisions of Section 01700, Contract Closeout.
- D. Include recommended preventive maintenance procedures and materials.

1.06. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 10 years' documented experience.

PART 2 PRODUCTS

2.01. PILOT DEVICES

- A. General
 - 1. Pilot devices shall include indicating light, pushbuttons, and selector switches.
 - 2. Heavy-duty, industrial type, construction.
 - 3. Area Classification
 - a. Non-Classified Area Device Rating - NEMA 13 oil-tight.
 - b. Wet Area or Exterior Device Rating - NEMA 4 and NEMA 13 oil-tight and watertight.
 - c. Corrosive Area Device Rating - NEMA 4X, non-metallic.

- d. Hazardous Area Device Rating - NEMA 7, explosionproof.
 - 4. Provide extra large nameplates in accordance with Section 16055, Electrical Work, for all door or enclosure front-mounted devices.
 - 5. Controls and relays shall be by one manufacturer wherever possible.
 - 6. Provide enclosure for field mounted devices and individual controls in accordance with Section 16161, Control Panels and Enclosures.
 - 7. 30-millimeter diameter.
 - 8. Retaining ring and boot type.
- B. Pushbuttons and Selector Switches (PB) and (SEL SW)
- 1. Lockout feature as indicated.
 - 2. Color - Red for stop or terminate function; black for all others.
 - 3. Operators
 - a. Provide “gloved hand” knobs for selector switches.
 - b. Provide “mushroom head” button on emergency stop pushbuttons.
 - 4. Stackable contact blocks.
 - 5. Devices shall be either momentary, maintained, spring return, push-pull, or other operational types as shown or otherwise specified.
 - 6. Manufacturer NEMA 4 and 13 Oil and Water Tight - General Electric, Square D Type K.
 - 7. Manufacturer NEMA 4X, Non-Metallic - Allen Bradley Type 800H, Square D Type SK.
 - 8. Manufacturer NEMA 7, Explosionproof - Allen Bradley Type 800H, Crouse-Hinds Type EFS and Type EMP for panel-mounted units.
- C. Indicating Pilot Lights (IL)
- 1. Glass or plastic lens.
 - 2. 120-volt LED type.
 - 3. Push-to-test type. When six or more pilot lights are used in control panels, a single lamp test switch can be used in lieu of all lamps being push-to-test.

4. Lens color shall be as follows:

Function	Color
Motor Running	Green
Motor Stopped	Red
Malfunction	Amber
Ready	White or Green

5. Manufacturers - General Electric, Square D, Crouse-Hinds, or Allen-Bradley.

2.02. CONTACT BLOCKS

- A. Molded of an amorphous transparent polyamid material with high impact resistance and resistant to carbon tracking.
- B. Contacts - Double break silver type rated at 10 amp at 120 VAC continuous.

2.03. CONTROL POWER TRANSFORMER (CPT)

- A. Standard industrial control type, VA size as required for the powered load.
- B. Dual voltage primary, with 120V ac, single phase secondary. All primary connections fused; size as required for the transformer.
- C. Secondary control fuse with capacity for the control circuit indicated.
- D. DIN-rail-mounted type in control panels.
- E. Manufacturer - Square D, General Electric.

2.04. FUSE BLOCKS

- A. General purpose Class H, K, and R phenolic fuse block for dual-element cartridge fuses.
- B. DIN-rail mounted in control panels.
- C. Manufacturer - Buchanan or equal.

2.05. LIMIT SWITCHES (LS)

- A. Contacts - Silver-to-silver snap-acting where practicable and in all cases where the motion is slow.
- B. Switches - Operated by levers, plungers, or pushrods, depending on the application.
- C. Rollers - Provided where excessive wear due to a sliding action would result.

- D. Manufacturer - General Electric Class CR215G, Square D Class 9007 Type C.

2.06. ELAPSED TIME METERS (ETM)

- A. Minimum six-digit, non-resettable hour meter, panel mounted.
- B. For operation on 120 volts.
- C. Manufacturer - General Electric.

2.07. TIME DELAY RELAYS (TR)

- A. Solid-state type with calibrated dial head or dip switch adjustment, encapsulated coil, snap-action switch assembly of number of poles indicated.
- B. "On-Delay," "Off-Delay," or "On-Off Delay" dual head type as indicated; timing range intervals as shown or specified.
- C. Bases shall have captive screws for locking fork solderless connectors, single tier design, with relay retainer clips.
- D. Dust-tight construction.
- E. Provide auxiliary contacts where indicated.
- F. Contacts rated 10 amps resistive at 120 VAC.
- G. Manufacturer - Diversified Electronics Series "TD;" Square D, Type JCK; Timemark 300 Series.

2.08. GENERAL PURPOSE CONTROL RELAYS (CR)

- A. Units shall be plug-in type.
- B. Only for use in manufactured or custom-built control panels.
- C. Number of poles and arrangement as shown or specified.
- D. Contacts
 - 1. Shall be rated 10 amps at 240 volts AC.
 - 2. Material shall be silver cadmium oxide.
- E. Coils shall be rated continuous duty.
- F. Sockets
 - 1. Supply with relay retainer clip.

- 2. Terminal connections with captive screw to accept locking fork solderless connectors.
 - 3. Single tier design.
- G. Manufacturers - Square D Company Class 8501 Type K relay and Type NR socket; Potter-Brumfield; or equal.

2.09. INDUSTRIAL CONTROL RELAYS (CR)

- A. Industrial machine tool type.
- B. Use - Shall be used to control equipment with power requirements, such as solenoid valves.
- C. Contacts
 - 1. Double break field convertible.
 - 2. Rated 10 amps at 600 volts AC.
 - 3. Rated 5 amps at 250 volts DC.
- D. Coil shall be encapsulated, continuously rated of the voltage rating indicated on the plans.
- E. Number of poles as indicated on Contract Drawings, but not less than four.
- F. Holding and Operating Mechanism
 - 1. Electrically held, electrically operated, General Electric Company CR-120A; Square D Company Class 8501, Type X; or equal.
 - 2. Mechanically held/electrically held relay with mechanically-held attachment.
 - 3. Time Delay - Pneumatic timer attachment for electrically-held delay; “on delay” or “off delay” as indicated on plans.

2.10. INTRINSICALLY-SAFE BARRIERS

- A. Power supply, bistable input amplifier, intrinsically-safe for connections to passive devices located in hazardous areas.
- B. Relay Output Stage - LED indicator type.
- C. FM approved. Manufacturers: Pepperi & Fuchs WE Series, Square D, Class 8501.

2.11. LIQUID LEVEL SENSORS (FLOATS)

- A. Contacts - A normally open, normally closed mechanical micro switch SPDT (single break) totally encapsulated in epoxy or polyurethane. Mercury switches are not acceptable.

- B. Cable - Type STO or SJO cable of sufficient length (65 feet minimum length) to reach the first junction box with minimum conductor size of 19 AWG.
- C. Sufficient excess cable shall be provided with each liquid level sensor to adjust its vertical position 1 foot \pm of its original setting.
- D. Provide stainless steel mounting brackets to support all float switches.
- E. Manufacturer - Flygt Model ENM-10 or equal.

2.12 DOOR CONTACTS

- A. Magnetic door contact, surface mount, IP67, -40-150°F temp range, aluminum housing, 120VAC, normally open wide gap.
- B. Manufacturer – Edwards Signaling Sentrol 2505A series, or equal.
- C. Manufacturer – Edwards Signaling Sentrol 2845T series, or equal, for hazardous Class 1, Division 1, Group D areas.

2.13 SMOKE DETECTORS

- A. GENTEX S1209F smoke detector with built-in Form C relay, 120VAC, integral 85 dBA horn, 9V battery backup, or equal.

PART 3 EXECUTION

3.01. GENERAL

- A. Mount all individual controls in a suitable enclosure as specified per Section 16161, Control Panels and Enclosures.
- B. Identify all auxiliary controls per Section 16055, Electrical Work.
- C. General purpose control relays shall be used in manufactured or custom-built control panels. The Contractor shall use control relays as described in Article 2.09 to control equipment with power requirements, such as solenoid valves.

3.02. CONTROL POWER TRANSFORMER

- A. Provide individual control power transformers for each control circuit.
- B. Size as required by control circuit.

3.03. FUSE BLOCKS

- A. Size as indicated on Drawings or as required.

3.04. LIMIT SWITCHES

- A. Limit switches shall be provided where specified and where it is required to convert a mechanical motion into the control of an electric circuit.

3.05. PUSHBUTTONS AND SELECTOR SWITCHES

- A. Units shall be back-mounted wherever possible.

3.06. FLOATS

- A. Mount floats per the installation notes or details as shown on the Drawings.

END OF SECTION

SECTION 16950

TESTING AND INSPECTION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Electrical power distribution and control circuit testing.

1.02. SUBMITTALS

- A. Made in accordance with Sections 01300, Submittals, and 16055, Electrical Work, and as specified herein.
- B. Submit test records and reports for all testing.

1.03. CERTIFICATION OF TESTING

- A. Perform all tests in the presence of a duly authorized representative of the Owner unless waived in writing by the Engineer. When the presence of such representative is so waived, certified results of the tests made and the results thereof shall be furnished by the Contractor.
- B. Perform all tests in the presence of the Engineer. Give the Engineer written notice of all tests at least two weeks in advance.

1.04. TEST EQUIPMENT

- A. Furnish all instruments and a qualified engineer to properly perform all tests required.

1.05. FACTORY-TRAINED SUPERVISION

- A. Provide necessary factory trained supervision to check over equipment for proper functioning before putting the equipment into operation as may be required by these specifications. This shall include establishing a simulated fault on checking out the coordination of the protective devices.
- B. Make necessary adjustments and testing in cooperation with the respective manufacturers and other Contractors when necessary. Perform all tests in accordance with the latest standards of the ANSI, IPCEA, IEEE and NEMA.

1.06. COSTS

- A. Costs of all tests shall be borne by the Contractor and shall be included in the contract price.

1.07. DAMAGES

- A. If damage is indicated or observed during testing or from the review of tabulated data, replace defective or damaged materials and retest at no cost to the Owner.

PART 2 MATERIALS

2.01. TESTING EQUIPMENT

- A. Furnish all test equipment required to correctly perform the system tests.

2.02. SPECIAL EQUIPMENT REQUIREMENTS

- A. 500-volt dc Megger - For maximum 300-volt systems, use a hand crank only.
- B. 1,000-volt dc Megger - For maximum 600-volt systems, use a hand crank only.

PART 3 EXECUTION

3.01. GENERAL

- A. After completion of the work, thoroughly test the entire electrical system, including electrical work required for instrumentation, control and power, and adjust electrical system as required.
- B. Test all electrical circuits to insure circuit continuity, insulation resistance, proper splicing, and freedom from improper grounds.
- C. System performance test runs are required. Coordinate test runs of electrical systems with test runs of equipment served thereby (i.e., mechanical, heating, air conditioning, process systems and plumbing).

3.02. GENERAL TESTING METHODS

- A. Panels - Test each panel with mains disconnected from the feeder, branches connected, branch circuit breakers closed, all fixtures in place and permanently connected, lamps removed or omitted from the sockets, and all wall switches closed.
- B. Feeders - Test with the feeders disconnected from the panels.
- C. Individual Power Circuits - Test each individual power circuit at the panel or motor control center with the power equipment connected for proper operation.
- D. Transformers (Low Voltage) - Megohmmeter test all transformers in accordance with the manufacturer's recommendations.
- E. Lighting and receptacle circuits do not need to be megger tested.

3.03. EQUIPMENT TESTING (600 volts and below)

A. Megohmmeter Tests

1. Conduct megohmmeter tests of the insulation resistance of rotating machines and power distribution feeders down to panelboard feeders. The results will be accepted when the megger shows the insulation resistance to be not less than 50 megohms at 20 degrees C using either a 500-volt or 1,000-volt megger. Wait 1 minute between each test for all conductors in the same enclosure and each conductor and ground.
2. Perform megohmmeter testing (Insulation Resistance Test) of all motor power and control wiring after the cables are in place and just prior to final terminations. Record all data as per Exhibit A. Lighting and receptacle panelboard branch circuits are not megohmmeter tested.

B. Voltage and Amperage Testing

1. Check all single and three phase motor amperage while the unit is running at as close to operating load as possible. Record voltage on each line and the amp draw for each leg. Provide results in a typed report format and submit as part of the Contractor's closeout package.
2. Check the load current in each phase of each distribution, lighting and receptacle panelboard feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for each panelboard.

3.04. GROUNDING SYSTEM

- #### A.
- Test the grounding system to verify a resistance to ground of 5 ohms or less. If the resistance is greater than 5 ohms, modifications shall be made to the system by adding additional ground rods or plates to bring the resistance test value to 5 ohms or less. Submit a record/report to the Engineer. Include the following:

1. Time, date, temperature, frost information depth (if applicable), and weather conditions.
2. Moisture content of earth at time of measurement (wet, dry, etc.).
3. Ground test equipment, model numbers, and last date of calibration.
4. Detailed description of method used.
5. Plot of "distance from ground grid versus resistance." Resistances shall range from 0-50 ohms with enough points to produce a smooth curve.
6. Maintenance information and recommendations (if applicable).

- #### B.
- Test all grounding conductors and grounding systems for continuity. Where continuity does not exist, conditions will be corrected by an approved method and the system retested.

3.05. SYSTEM LOAD BALANCING

- A. Check the load current in each phase of each distribution panel feeder and make modifications to the circuit loading to correct load unbalance to within 1 kVA phase to phase for distribution panels.

3.06. SYSTEM CHECKS

A. Preliminary

1. Connect all motors to protective devices and controls to give proper motor acceleration and correct motor rotation. Interconnect the control wiring to all the control devices associated with a machine, a group of machines, or other device to produce the correct operation, timing, and/or sequencing of the equipment.
2. Adjust overload elements in motor starters and check for coordination with the actual installed motor characteristics. Replace any overload element that is inadequate.
3. Check all motor nameplates for verification of proper voltage, horsepower, speed, phase, and power factor.

B. Operational

1. Then give the equipment an operational test to determine that all components including motors, controls, protective and switching devices, and auxiliary associated equipment are in operable condition and can function as described and shown on relevant specifications, operating instructions, and drawings.
2. Take motor current reading at full load or as close to full load as the driven machine will develop. If the ammeter reading is over the rated full load current or the proper current for the load at which the machine was operated, determine the reason for the discrepancy and take the necessary corrective action.
3. Remove the cause of any motor operating above full load rating instead of increasing the overload relay trip rating.

3.07. CLOSEOUT PROCEDURES

- A. General - Sequence closeout procedures so that work will not be endangered or damaged, and so that every required performance will be fully tested and demonstrated. Closeout shall be in accordance with Section 01700, Contract Closeout, and as required herein.
- B. Final Operational Check - Make a check of each item in each system to determine that it is set for proper operation. With the Engineer present, operate each system in a test run of appropriate duration to demonstrate compliance with performance requirements. During the following test runs, make final corrections or adjustments of systems to refine and improve performances where possible, including noise and vibration reductions, elimination of hazards, better response of controls, signals and alarms, and similar system performance improvements. Provide testing or inspection devices to permit observation of actual system performances and shall demonstrate that controls and items requiring service or maintenance are accessible.

- C. Cleaning and Lubrication - After final performance test run of each electrical system, clean system both externally and internally, comply with manufacturer's instructions for lubrication of both power and hand operated equipment, and remove excess lubrication, touch up minor damage to factory-painted finishes and other painting specified as electrical work, and refinish work where damage is extensive.
- D. Operating Instructions - General operating instructions are required. In addition to specific training of the Owner's operating personnel specified in the individual sections, and in addition to preparation of written operating instructions and compiled maintenance manuals specified elsewhere in these specifications, provide general operating instructions for each operational system and equipment item of electrical work, and coordinate instructions with instructions for mechanical work, and other equipment where associated with electrical systems or equipment.
- E. System Description and Operation
 - 1. Perform in the presence of the Owner, the Owner's operating personnel and the Engineer.
 - 2. Describe each basic electrical system and explain identification system, displayed diagrams, signals, alarms and audio visual provisions.
 - 3. Describe interfaces with mechanical equipment, including interlocks, sequencing, startup, shutdown, emergency, safety, system failure, security, and similar provisions.
 - 4. In the presence of the Owner's personnel, display and conduct a "thumb-through" explanation of maintenance manuals, record drawings, spare parts inventory, storage and extra materials, meter readings, and similar service items.

3.08. CONTINUED SYSTEM OPERATIONS SUPPORT

- A. Coordinate the Owner's takeover of electrical systems with takeover of mechanical systems, including the provision of skilled electrical operating and maintenance personnel until the time the Owner's personnel take over operation of entire mechanical and electrical plant. Respond promptly with continued consultation and services (beyond takeover date) on electrical systems, matching required continued services on associated mechanical systems and equipment until the end of the warranty period.

3.09. DOCUMENTATION PROCEDURE

- A. Signed commitments are required. The transfer of electrical systems to the Owner for operation will not proceed until guarantees, warranties, performance certifications, maintenance agreements and similar commitments to be signed by Contractor and other entities have been executed and transmitted to and accepted by the Engineer for placement in the Owner's records.

3.10. THERMOGRAPH INSPECTIONS

- A. Perform thermograph inspections on all service terminations, subfeed terminations, major power splices, and motor terminations for motors 5 HP or larger. Testing on major power distribution equipment will be performed with the plant running at a minimum of 70 percent capacity or the highest load that can be operated. Testing on individual pieces of equipment will be performed while the unit is operational at rated load and has operated for at least 30 minutes for continuously operated equipment or near the end of a cycle for equipment that operates on/off. Loads shall be minimum of 40 percent of full load. Readings at overcurrent devices and starters will be for line and load; motors will be connections in motor terminal boxes; and for transformers, primary and secondary terminations. Provide a report of test results to the Owner including indication of any actions taken to resolve abnormal readings. See Exhibit B at the end of this section. All thermographic tests shall be reported on this form.

(continued)

EXHIBIT A
TESTING AND INSPECTION
ELECTRICAL INSULATION TEST RECORD
INSULATION RESISTANCE TEST

EQUIP. I.D. CKT/MARK NO.	TEST VOLTAGE	PHASE TO GND, MEG OHMS				PHASE TO PHASE MEG OHMS						DATE TESTED
		A	B	C	N	A-B	A-N	B-C	B-N	C-A	C-N	

TEST EQUIPMENT CONTROL NO. _____

REMARKS: _____

PERFORMED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____
Test Engineer

EXHIBIT B

TESTING AND INSPECTION

THERMOGRAPHIC TERMINATION TEST

EQUIPMENT	AMBIENT ⁽¹⁾	LINE/PRIMARY			LOAD/SECONDARY			LOAD CONDITION (% OF FULL)	COMMENTS ^(2,3)
		1	2	3	1	2	3		

Thermograph Model _____

Date of Test _____ Conducted by _____

Outdoor Temperature _____ Room Temperature _____

Owner/Engineer Witness _____

- (1) Ambient is the breaker case temperature, transformer winding temperature, or motor housing temperature. For bus or cabling, it shall be the temperature of the bus or cable a minimum of 24 inches from the splice or termination.

(2)

Temperature Difference	Condition	Action
1°C to 3°C	Possible Deficiency	Investigate, i.e., clean terminations/retorque
4°C to 15°C	Deficiency	Determine problem and repair; retest
16°C and above	Major Deficiency	Immediate shutdown; determine problem and repair and retest

- (3) Indicate any discrepancies the cause of any temperature differences and indicate action to be taken.

Test Parameters:

- Imaging equipment shall be capable of detecting a minimum temperature difference of 1 degree at 30 degrees C.
- Equipment shall detect and convert emitted radiation to a visual signal.
- Tests to be run during periods of maximum possible loading, but at least 40 percent of rated load.

END OF SECTION

SECTION 17095

CUSTOM CONTROL PANELS AND INTEGRATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. It is the intent that the Contractor will work with a system integrator (CSI) to successfully fulfill the requirements herein and shown on the Contract Drawings to provide a complete and operable control system (fully integrated) with the intent specified and shown on the Contract Drawings.
- B. System integrator referenced throughout this specification is referring to the panel provider.

1.02 SECTION INCLUDES

- A. Station Control Panel (JA-SCP)
- B. Bubbler Wetwell Level Detection System
- C. Submersible Pressure Transducers
- D. Backup Float Control Panel (BUFCP)
- E. Float Switches
- F. Magnetic Flow Meter
- G. Pressure Transmitter
- H. Chart Recorder
- I. Auto-Dialer
- J. Software
- K. Integration Services, Programming, and Screen Development
- L. Sequence of Operations
- M. Commissioning, Startup Services, & Training
- N. I/O Table

1.03 REFERENCE STANDARDS

- A. All control systems as specified herein shall be provided in accordance with the latest additions of the NEC and IEC.

- B. All wiring shall be in complete conformance with the National Electrical Code, State, local and NEMA electrical standards. All incoming and outgoing wires shall be connected to numbered terminal blocks and all wiring neatly tied and fastened to chassis as required.
- C. All control panels shall be UL 508A listed or UL 698A listed whichever may be applicable. The UL 508A/698A “sticker” shall be clearly displayed in the appropriate location within the panel. Third party substitutions of UL 508A/698A listed equipment shall be strictly prohibited.
- D. All equipment and installations shall satisfy applicable Federal, State, and local codes.
- E. Furnish products listed and classified by Underwriters Laboratories (UL), CSA, or FM approval as suitable for purpose specified and indicated.
- F. Auxiliary and accessory devices necessary for system operation or performance, such as transducers, relays, signal amplifiers, intrinsic safety barriers, signal isolators, software, and drivers to interface with existing equipment or equipment provided by others under other Sections of these specifications, shall be included whether they are shown on the Drawings or not.
- G. Use the equipment, instrument, and loop numbering scheme shown on the Drawings and specifications in the development of the submittals. Do not deviate from or modify the numbering scheme without the Engineer's approval.

1.04 RELATED SECTIONS

- A. Contractor to coordinate sequence of operation with the Engineer and Owner.
 - 1. Contractor to include two (2) 4-hour meetings with the Engineer and Owner to discuss/finalize sequence of operation in which control system is to be programmed for.
 - a. Meetings to take place at the project site.
- B. Section 11303 – Dry Pit Submersible Pumps
- C. Section 16484 – Contactors & Motor Starting Equipment

1.05 SUBMITTALS

- A. The Systems Integrator shall for review, provide to the contractor, for submission to the Engineer, three (3) hardcopy sets and one (1) electronic copy (USB) of the following documentation:
 - 1. Written Sequence of Control System Operation (coordinate as required with the Engineer and Owner).
 - 2. Electrical and Mechanical Schematic Drawings.
 - 3. Bill of Materials.
 - 4. Vendor Data Sheets.

5. System Warranty (see below).
 6. System Integrator Qualifications (see below).
 7. Control Panel Heat Dissipation Calculations
 8. Uninterruptable Power Supply sizing calculations.
 9. Point to point wiring diagrams. Diagrams to detail terminal block numbers specific to which each signal is to be landed. Refer to article 3.01 for further detail/requirements.
- B. The Engineer shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture.
- C. The Contractor shall make all arrangements and pay for all travel and expenses for up to three people from the Owner and Owner's Engineer to witness the shop tests.

1.06 OPERATIONS AND MAINTENANCE DOCUMENTATION

- A. The Systems Integrator shall provide to the contractor, three (3) hardcopy sets and one (1) electronic copy (USB) of the following Operations and Maintenance documentation; all documentation shall be neatly bound in 3-ring binders.
1. Final Written sequence of control system operation (coordinate as required with the Engineer and Owner).
 2. As-Installed Electrical and Mechanical Schematic Drawings.
 3. Bill of Materials.
 4. Vendor Operation, Maintenance and troubleshooting documentation.
 5. PLC and OIT program printouts.
 6. Back-up Copies of As-installed PLC and OIT programs on CD and USB thumb drive.
 7. Point to point wiring diagrams indicating as-built conditions.

1.07 WARRANTY

A. JA-SCP

The Systems Integrator shall provide with the above submittals, a written parts warranty against system failure for twelve (12) months from system startup, not to exceed eighteen (18) months from date of shipment from their factory. This warranty period will, except for human negligence or acts of nature such as lightning, floods, etc., provide for repair or replacement of any defective or failed components, at the project site, and at no cost to others.

- B. Contractor to provide two-year warranty for all instruments specified/provided as part of this section. Warranty to cover the entire instrument including any associated transmitters/controllers, flow tubes, etc... This warranty period will, except for human negligence or acts of nature such as lightning, floods, etc., provide for repair or replacement of any defective or failed components, at the project site, and at no cost to others.

1.08 QUALITY ASSURANCE

- A. The Equipment, controls and accessories covered in this specification section constitute a completely integrated system, designed, constructed, programmed, and tested by one Systems Integrator, accountable for its operation and performance. The Systems Integrator shall be selected based on their ability to Engineer, design and manufacture systems of the type herein specified.
- B. The Contractor shall submit to the Engineer the name of the System Integrator to whom they propose to award the work. No Systems Integrator will be approved by the Engineer who cannot furnish satisfactory proof of at least five (5) successful installations which in the judgment of the Engineer are of equal or greater complexity to that described herein.
- C. The Systems Integrator shall be a reputable firm that has been in the business of providing automated control systems specifically for the water and wastewater treatment industry for a minimum of ten (10) years. Systems Integrators with less than ten (10) years of experience will not be accepted.
- D. The Systems Integrator shall have as a minimum, five (5) full time employees who are experienced in routine and emergency services of the equipment herein specified. The Systems Integrator shall as a minimum provide two (2) direct cell phone numbers in which service personnel can be reached 24hrs, 7 days a week.
- E. The System Integrator shall be U.L. approved for manufacturing systems in compliance with UL 508A and/or UL 698A whichever may be applicable. Each assembly and subassembly of the system shall be listed and labeled as U.L. approved. Systems Integrators who outsource panel fabrication services for the purpose of providing UL labeling will not be accepted.
- F. For serviceability reasons the system integrator's service facility shall be located within 100 miles of the project site. In addition, they must possess a factory trained, service staff experienced in routine and emergency service of the type of equipment herein specified who are located within a maximum of two (2) hours of the project site.
 - 1. The Systems Integrator shall be Aaron Associates of CT, Inc. or approved equal
 - a. 2 Mattoon Road
Waterbury, CT 06708
Phone: (203) 753-1536
- G. Control panels shall be fabricated with the following features as a minimum:
 - 1. All sub panel wiring shall be run in plastic wire duct sized with 50% spare space, AC and DC wiring shall be run in separate wire ducts.

2. All power supplies shall be sized for an additional 50% spare ampacity over expected load. Each power supply shall include an AC input fuse and independent output fuses for each device requiring DC power.
 3. All field terminations shall be made on screw type terminal blocks labeled according to wire number, separate terminal strips shall be provided for AC and DC signals. A minimum of 20% spare terminals shall be provided.
 4. Wiring to door mounted components shall be neatly bundled wiring harnesses protected by plastic spiral wire wrap when crossing door hinge. Wiring harnesses shall have adequate stress loops and be fastened at both sides of hinge crossing.
 5. All wiring shall be wire numbered at both ends with plastic Brady type labels.
 6. All nameplates shall be engraved on lamacoid material providing black lettering on a white background. Lettering shall be no smaller than 1/8 of an inch in height.
 7. Twenty percent spare mounting space is required for future modifications.
- H. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
- I. It is a requirement of this specification that all equipment, devices, instruments, and ancillary elements specified herein be furnished by a single supplier. The supplier shall have total responsibility for the equipment and services specified within this section.

1.09 ENVIRONMENTAL CONTROL OF PANELS

- A. Panels shall be provided with louvers, sun shields, heat sinks, forced air ventilation, or air conditioning units as required to prevent temperature buildup inside of panel. Internal temperature of all panels shall be regulated to a range of 45 Deg F to 104 Deg F under all conditions. Under no circumstances shall panel cooling or heating equipment compromise the NEMA rating of the panel.
1. Refer to submittal article above and article 2.01(C) below for additional information/requirements.
- B. For panels with internal heat that cannot be adequately dissipated with natural convection and heat sinks, or forced air ventilation, an air conditioner shall be provided.

1.10 DESCRIPTION OF OPERATION

- A. Overview
1. The System Integrator shall supply for contractor's installation the control panel specified herein. The control panel shall through communications and/or hardwired status and alarm signals monitor/control the operations of process equipment, vendor supplied equipment, and all equipment/devices pertinent to the operations of the pump station.

2. The Station Control Panel shall provide local alarm monitoring by door mounted common alarm lights, momentary pushbutton (for alarm acknowledgement, reset, and horn silence) alarm horn and Operator Interface Terminal (OIT).
3. Refer to the Contract Drawings for intent and all equipment/components that control panel is to interface with.
4. Provide all hardware/software, programming, and services as herein specified to provide one (1) completely factory assembled and programmed Station Control Panel (JA-SCP).
5. System integration, programming, screen development, and startup services are to be provided as part of this contract/specification.
6. Contractor and Systems Integrator to provide two (2) 4-hour meetings with the Owner/Engineer at the project site to discuss control panel programming, sequence of operation, and overall intent to ensure specified control panel is programmed properly.
 - a. Coordinate meeting with Owner/Engineer two weeks in advance and prior to submittal documentation submission.
7. Note, the programming/logic to accomplish the sequence outlined below has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.

B. Sequence of Operations

1. The station control panel to be PLC based and completely factory programmed as required to provide the following control strategies. All control strategies to be fully coordinated with the Owner and Engineer. Refer to above required meetings to review sequence and finalize programming requirements.
 - a. Wetwell Level Monitoring:
 - 1) Primary wetwell level detection to be by means of a bubbler system while secondary wetwell level detection to be by means of a submersible pressure transducer. Since the wetwell is dual chamber, there is to be a single bubbler system with tubing that is split/valved to serve each chamber of the wetwell. There will then be two (2) independent submersible pressure transducers, one in each wetwell chamber for secondary level detection.
 - a) Bubbler System – wetwell level shall be measured by a pressure-to-current (P/I) transmitter. Major system components shall consist of the P/I transmitter, low pressure air supply, and two air-lines extending into and terminating near the bottom of each wetwell. An air selector valve shall be provided to allow either of the two wetwell levels to be monitored. The air supply shall continuously purge the selected airline. P/I transmitter outputs shall be 4-20mA DC proportional to wetwell level and shall be connected to the

station control panel PLC through an analog input. The JA-SCP shall utilize this signal for control, monitoring, trending, and alarming. Ancillary bubbler system components shall include, but not be limited to, the following: two (2) air compressors, one (1) air flow indicator, air pump selector switch, wetwell airline selector switch, 3/8" & 1/2" air piping, and two (2) 3" PVC air bells for installation within each chamber of the wet well.

- b) Submersible Pressure Transducer – A submersible pressure transducer shall be provided for installation within each wetwell chamber (typical of 2). The transducer shall provide a 4-20 mAdc signal linear and proportional to wetwell level. The station control panel shall utilize this signal for control, monitoring, trending, and alarm functions. Provide an additional selector switch to provide the operator the ability to select between the two (2) pressure transducers as to which is being used for level control.

b. Level Control Mode Selection:

- 1) A level control mode selection (Primary Bubbler / Secondary Transducer) switch to be provided on the JA-SCP door. Each mode to operate as follows:
 - a) Primary Bubbler – JA-SCP system logic provides variable level control of wetwell level by use of associated pump soft starters as described below. Control mode remains in primary bubbler level mode until altered by operator or float mode enabled (refer to below backup float control panel specifications).
 - b) Secondary Transducer – JA-SCP system logic provides variable level control of wetwell level by use of associated pump soft starters as described below. Control mode remains in secondary transducer level mode until altered by operator or float mode enabled (refer to below backup float control panel specifications).
 - c) Note, there is an independent backup float control panel specified as part of this specification. The backup float control system will serve as backup level control for the station when in either mode (bubbler vs transducer) described above. The backup float system is initiated by a high-high level float. Refer to below backup float control panel specifications and electrical drawings for additional information.

c. Wetwell Level Control (Variable Level):

- 1) As level in the wetwell rises above an adjustable Lead Pump "ON" setpoint, system logic shall start the lead pump by use of an associated soft starter. The soft starter shall ramp up in speed to begin pumping down the wetwell. The adjustable lead pump on setpoint shall be fully adjustable via the JA-SCP door mounted Operator Interface Terminal (OIT).

- 2) Should influent flow (wetwell level) exceed the capacity of the lead pump, system logic shall automatically stage on the first lag pump after the lead pump has been operating at its maximum speed for a programmable time delay. The lead pump time delay setpoint for staging on the first lag pump shall be fully adjustable via the JA-SCP door mounted OIT.
- 3) Should the wetwell level decrease (while both pumps are operating) to below the Lag Pump "OFF" setpoint for a programmable time delay, system logic shall turn the lag pump off by use of an associated soft starter. The lead pump shall continue pumping until the wetwell level has decreased to below the lead pump off setpoint for a programmable time delay. The lead pump shall remain off until wetwell level once again rises above the Lead Pump "ON" setpoint initiating the next pump down cycle.

The time delay settings and wetwell pump off setpoints shall be fully adjustable via the JA-SCP door mounted OIT.

- 4) Should influent flow exceed the capacity of the lead and first lag pumps (while operating together), system logic shall automatically stage on the second lag pump after the initial two pumps have been operating at maximum speed for a programmable time delay. The lead/lag pumps time delay setpoints for staging on the second lag pump shall be fully adjustable via the JA-SCP door mounted OIT.
- 5) Should wetwell level decrease (while all three pumps are operating) to below the second lag pump "OFF" setpoint for a programmable time delay, system logic shall shut the second lag pump down and the remaining two pumps shall continue to pump. The time delay setpoints for staging off the second lag pump shall be fully adjustable via the JA-SCP door mounted OIT.
- 6) Note, three (3) pumps maximum can be called to run at the same time with the fourth pump being a standby. Time delays, pump on, pump off, etc. are to all be user adjustable at the JA-SCP door mounted OIT.
- 7) Operator adjustable high and low level alarm setpoints shall be provided for alarm annunciation of an abnormally high or low wetwell level condition. Alarm setpoints and associated time delays for high and low level alarms shall be fully adjustable via the JA-SCP door mounted OIT. All level alarms shall be annunciated on the JA-SCP door mounted OIT, common alarm light and alarm horn.

d. Pump Alternation and Sequence Selection:

- 1) Pump alternation and sequence selection shall be provided for the Stations thru the door mounted OIT on the JA-SCP.

- a) Manual Selection – A manual sequence table will be provided on the door mounted OIT. Operator to have the ability to choose which pump becomes the lead pump and the following lag pump sequence.
 - b) Selection Auto – Lead Pump determined by system logic, alternation between pumps on each pump down cycle, lead pump runtime (adjustable via OIT), or upon lead pump not being available for operation.
- e. Pump Motor Winding Temperature Monitoring:
 - 1) Each pump is equipped with seal leak detection and high motor winding temperature switches. The station control panel shall monitor these elements via discrete PLC inputs.
 - 2) In the event of a motor winding temperature alarm, system logic shall shutdown the respective pump and render it unavailable for operation.
 - 3) In similar fashion in the event of a seal leak detection/condition, system logic shall shutdown the respective pump and render it unavailable for operation.
 - 4) All seal leak and motor high temperature alarms shall be annunciated on the JA-SCP door mounted OIT, common alarm light and alarm horn.
- f. Pump Availability:
 - 1) A pump shall be considered unavailable for operation when any of the following conditions occur:
 - a) Respective pump mode of operation selector switch is in the “OFF” position
 - b) Respective pump fails to start
 - c) Respective pump soft starter failure
 - d) Wet well low-level condition
 - e) Motor winding high-temperature condition
 - f) Pump seal leak condition
- g. Additional System Monitoring:
 - 1) In addition to monitoring and controlling the Stations based upon wetwell level it is anticipated that the JA-SCP will monitor the following systems:
 - a) Ventilation system
 - b) Emergency generator system

- c) Backup float control panel
 - d) Door contacts (intrusion)
 - e) Smoke/Heat detectors
 - f) Gas monitoring system
 - g) Various instruments (pressure, flow, etc.)
 - h) Refer to Contract Drawings and I/O Table for additional information and I/O that is to be incorporated at the JA-SCP.
- h. Alarm Monitoring:
- 1) All system alarms shall be annunciated locally via the panel mounted OIT, common alarm pilot light, and alarm horn. Alarm acknowledgement, reset, and horn silence of alarms shall be provided by an JA-SCP door mounted pushbutton.

PART 2 PRODUCTS

2.01 STATION CONTROL PANEL (JA-SCP)

- A. The control panel shall be housed in NEMA 4X floor mount enclosure constructed of 316 stainless steel. The enclosure shall be provided with an inner swingout panel for mounting of door interlocked disconnect switch, fault reset push buttons, OIT, pilot lights, pushbuttons, and switches as specified below. The enclosure shall be 62" high by 48" wide by 18" deep. Dimensions provided are maximum. Contractor may utilize smaller enclosure if approved by the Engineer to house the hardware specified and meet the intent of the specification herein.
 - 1. Provide enclosure with 12" floor stand kit.
 - 2. Provide enclosure as double door with 3-point latch system.
 - 3. Provide doors with gasket system.
 - 4. Control panel to be provided with a NEMA 4X fan/filter and thermostat kit per manufacturers recommendations.
 - 5. Control panel to be provided with internal climate control heater (refer to below).
 - 6. Bottom six (6) inches within enclosure to be free of all hardware, devices, components, terminal blocks, etc. to provide ease of installation and testing.
 - 7. The enclosure to be Hoffman A62H4818SS6LP3PT or approved equal.

- B. Control panel shall be equipped with a climate control heater designed to protect sensitive electronic equipment from the harmful effects of condensation, corrosion, and low temperatures. The heater shall have the following features as a minimum (to be confirmed with manufacturer during submittal phase):
 - 1. Operating voltage - 115VAC
 - 2. Wattage - 200W
 - 3. Durable anodized aluminum housing
 - 4. Integral thermostat adjustable from 0°F to 100°F (-18°C to 38°C)
 - 5. Continuously running ball bearing fan for even temperature distribution
- C. During submittal phase manufacturer to provide quantifiable control panel heating/heat loss calculations, in which results would indicate if control panel air conditioning is required or not. Intent is to detail if cooling (Air Conditioning) is required for the control panel. Contractor to provide air conditioning unit for the control panel if recommended by manufacturer/CSI because of the calculations. For bidding purposes contractor to assume A/C unit is required to be provided for the control panel. Calculation to consider the following:
 - 1. Calculate total heat generated.
 - 2. Calculate temperature rise
 - 3. Calculate heat dissipation
 - 4. Compare/contrast calculation versus component ratings.
- D. Control panel shall be UL 508A listed or UL 698A listed whichever is applicable. The UL “sticker” shall be clearly displayed in the appropriate location within the panel. Third party substitutions of UL 508A/698A listed equipment shall be strictly prohibited.
- E. Panel Input power shall be 120VAC, 1 Phase, 60Hz. Provide a sufficiently sized main circuit breaker disconnecting means. Interlock main circuit breaker disconnect with the control panel door handle.
- F. Refer to Electrical Drawings for additional information/requirements.
- G. A 120VAC single phase surge protector shall be provided for the incoming 120VAC supply. The surge protector shall be designed to protect electrical and electronic equipment against transients caused by lightning, induction, load switching, EMP and other sources. Line to neutral, line to ground and neutral to ground protection shall be provided. The surge protector shall have a protection level of 1kV and a maximum discharge current of 140 kA as a minimum. The surge protector shall have a remote signaling device for fault indication to the PLC. The AC surge protector shall be CITEL model DS72RS-120 or approved equal.
- H. All communication cabling that exits the building shall have surge protection provided.

- I. An analog signal surge protector shall be provided for protecting analog input signals from electrical surges caused by lightning and other sources. The surge protector shall have the following features as a minimum:
 - 1. Designed specifically for 4-20 mA_{dc} and pulse signal lines including both two and four wire transmitters
 - 2. Shall be capable of absorbing electrical surges with no interruption to instrumentation signal
 - 3. Shall have a removable arrester element that when unplugged from the base will not interrupt the instrumentation signal
 - 4. Surge protector housing shall be constructed of flame-resistant resin
 - 5. Maximum Line Voltage of 30VDC
 - 6. Discharge Voltage – Line to line of 30V minimum and line to ground of 500V minimum
 - 7. Maximum Surge Voltage – Line to line of 40V maximum and line to ground of 650V maximum
 - 8. Response Time – Line to line of less than 4 nanoseconds and line to ground of less than 20 nanoseconds.
 - 9. Discharge Current Capacity of 5000A
 - 10. Internal series Resistance of approximately 20 ohm including return
- J. Short circuit protection of 120VAC input and UPS control power shall be provided by a miniature branch rated circuit breaker with an interruptive capacity of 10K amperes at 240VAC. Circuit Breakers shall be Allen-Bradley 1489 series or approved equal
- K. One print pocket shall be provided on the control panel door. One complete set of electrical control drawings shall be provided in the pocket.
- L. Separate circuit breaker disconnects for each load supplied from the control panel shall be provided. All branch circuits shall be short circuit protected.
- M. The control panel shall be provided with an Uninterruptible Power Supply (UPS) for protection against power disturbances, noise, and brownouts. Refer to article below for UPS specifications.
- N. The station control panel shall be provided with a Programmable Logic Controller (PLC). The PLC shall be factory programmed, tested, and debugged to meet all the requirements of the applicable process. Refer to article below for additional PLC specifications/requirements.

1. Note, the programming/logic to accomplish the sequence outlined within this specification has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.
- O. The control panel shall be provided with a door mounted 10" Operator Interface Terminal (OIT) for system monitoring, setpoint entry/review and alarm annunciation. Communications between the OIT and PLC shall be Ethernet. The OIT shall be color touchscreen. Refer to article below for OIT specifications.
- P. The control panel shall be provided space to install an Owner furnished Ethernet switch/media converter for network communications and programming. Additional Ethernet ports to be available for system programming, connectivity to future Local Area Network (LAN), and connection to future Ethernet devices.
1. Networking switches inside the control panel shall be selected, configured, and furnished by the Owner. This contract to install Owner furnished switch within the control panel.
 2. Ethernet switch manufacturer and model shall be determined during the specified coordination meetings between the Owner, Engineer, and system supplier.
 3. Utilize IP addresses selected by the Owner.
- Q. Control panel shall be provided with a DC power supply: a 24V direct current power supply shall be provided to power the PLC, OIT, I/O, and all ancillary equipment. The power supply shall have an operational input range of 85 to 132VAC and shall have a minimum rated output of 24 to 28VDC/240 watts. Power supply shall be Weidmuller or approved equal.
- R. The control panel shall provide visual alarm annunciation via common alarm pilot light and OIT alarm screen. Pilot light shall be 30mm, industrial grade, push-to-test type, Allen-Bradley 800H series or approved equal.
1. Color coding for equipment status, pilot lights, and alarms shall be as follows:
 - a. Green for on, open, or running
 - b. Red for off, closed, or stopped
 - c. Amber for indication of malfunction, trouble, or alarm
 - d. Blue for indication of electrical power on
- S. The control panel shall provide audible alarm annunciation via alarm horn. Alarm horn shall provide a typical sound pressure of 95 + 5 dB(A) at 30VDC, at 24 inches and shall have a built-in volume control providing variable attenuation up to 20 dB(A). The alarm horn shall be Floyd Bell model MC-V09-530-Q or approved equal.

- T. A momentary pushbutton shall be provided for alarm acknowledgment/reset and alarm horn silence, pushbutton shall be 30mm industrial grade, Allen-Bradley 800H series or approved equal.
- U. Control panel shall have a single tube, LED light fixture, 10 Watt in size, mounted internally to the ceiling of the panel. Light fixture shall be switched and shall be complete with the lamp.
- V. Control panel shall have one (1) specification grade duplex convenience receptacle with ground fault interrupter, mounted internally within a stamped steel device box with appropriate cover. Convenience receptacle shall not be powered from a UPS and shall be protected by a dedicated fuse or circuit breaker.
- W. AC power fuses shall be provided as required for over current protection of individual AC powered panel components. Single circuit fusible terminal blocks with neon blown fuse indicators suitable for use with ¼" x 1 ¼" glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 100 to 300VAC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H4 or approved equal.
- X. DC power fuses shall be provided as required for over current protection of individual DC powered panel components. Single circuit fusible terminal blocks with LED blown fuse indicators suitable for use with ¼" x 1 ¼" glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 10 to 57V AC/DC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H5 or approved equal.
- Y. Interposing and control relays shall be provided as required. They shall be of industrial grade, plug-in socket type, and shall have 24VDC or 120VAC coils and 2PDT or 4PDT form C relays as required. All relay contacts shall be silver nickel plated, 2PDT relay contacts shall be rated for 10A at 300VAC and 4PDT relay contacts shall be rated for 7A at 300VAC. All relays shall be provided with a standard ON/OFF flag indicator, mounting base and retainer clip. Control relays shall be Allen-Bradley series 700-HC or approved equal.
- Z. Screw type terminal blocks shall be provided for all field connections, wiring field equipment directly to PLC I/O bases or other panel components is not acceptable. Terminal blocks shall have the following electrical ratings as a minimum:
 - 1. Two Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 20 Amp
 - c. Wire Size Range: 30-12 AWG
 - 2. Three Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 10 Amp

- c. Wire Size Range: 26-14 AWG
 - 3. Terminal blocks shall be Allen-Bradley series 1492 or approved equal.
 - AA. The station control panel is to interface with the operator control station for each of the pumps. Operator control station (hand-off-auto switch) located on the respective pump soft starter. Refer to below I/O list and electrical drawings for additional information.
 - AB. The JA-SCP shall be provided with intrinsically safe barrier(s) for the influent channel high level float switch, wetwell entry door contact, and wetwell access hatch door contact. All Intrinsically safe wiring shall be separated from other wiring by a distance of at least 2-inches, secured from conductors and cables of non-intrinsically safe circuits. Physical barriers shall be installed where required to prevent intrinsically safe circuits from encountering non-intrinsically safe circuitry. Refer to Electrical drawings for additional information.
 - AC. The control panels shall be provided with an integrally mounted and wired telephone alarm dialer for remote annunciation of system alarms. Refer to article below for additional dialer specifications/requirements.
 - AD. The control panel shall be completely factory assembled, wired, configured, and tested prior to being shipped to the project site.
 - 1. The Engineer shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture.
 - 2. The Contractor shall make all arrangements and pay for all travel and expenses for up to three people from the Owner and Owner's Engineer to witness the shop tests.
- 2.02 UNINTERRUPTIBLE POWER SUPPLIES (UPS)
- A. AC Input Parameters
 - 1. Surge Protection: 570J
 - 2. Voltage Range: 84VAC - 140VAC (+/- 10VAC)
 - 3. Frequency Range: 55-64 Hz. (+/- .1 Hz)
 - 4. Input Power Cord: 6 ft. attached, w/NEMA 5-15 P
 - B. AC Output Parameters
 - 1. Output Receptacles: Battery backup and surge protected Six (6) NEMA 5-15R, Surge protected only Two (2) NEMA 5-15R
 - 2. Voltage Normal Mode: Nominal (110, 120, 127VAC) +/-10%
 - 3. Voltage Battery Mode: 120VAC +/- 8%

4. Output: 1000VA, 8.3A
 - a. Contractor to confirm UPS sizing based upon devices shown on Contract Drawings requiring UPS power and internal control panel components specified herein. Adjust UPS output size/configuration as required to provide UPS power to devices shown on the Contract Drawings.
 5. Battery Mode Waveform: Computer Grade Sine Wave (Pure)
 6. Frequency: 50/ 60 Hz (auto sensing)
 7. Overload warning: greater than 100%
 8. Overload shutdown: greater than 110%
 - C. Data Line
 1. RJ11 (1 in/1 out), surge protected
 - D. Battery Parameters
 1. Battery Type: Valve-regulated, non-spill able, lead acid
 2. Battery Quantity: One (1), user replaceable
 3. Transfer Time: 4 - 6 milliseconds.
 4. Back-up Time: Full Load 15 minutes
 5. Recharge Time: 6 hours to 90% at rated capacity, after full discharge into resistive load.
 - E. Provide relay output module as required.
 - F. Provide dry contact module for battery low level alarm to be connected to the PLC.
 - G. The UPS shall be Liebert, APC (pure sine wave) or approved equal.
- 2.03 PROGRAMMABLE LOGIC CONTROLLERS (PLC)
- A. The Station control panel shall be provided with a Programmable Logic Controller (PLC). The PLC shall be factory programmed, tested, and debugged to meet all the requirements of the applicable process. PLC system to be CompactLogix platform as manufactured by Allen Bradley.
 - B. PLC system to have the following built-in communication ports:
 1. EtherNet/IP
 2. USB

- C. PLC system to have the following communications options:
 - 1. EtherNet/IP
 - 2. USB for firmware download and programming (local programming)
- D. PLC system to have an onboard display included.
- E. Controller Connections:
 - 1. 256 EtherNet/IP
 - 2. 120 TCP
- F. Contractor responsible for providing their own programming software support per manufacturer's recommendations to fulfill sequence of operations described above and overall project intent. Software does not need to be turned over to the Owner as part of this project.
- G. PLC system to have the capacity of storing up to 3MB of user memory.
- H. Local I/O expansion Modules.
 - 1. Provide all I/O modules (discrete & analog) and cards to meet site specific I/O requirements, plus 20% spare I/O points of each type used. Coordinate requirements with the Owner, Contract Drawings, and I/O table.
 - 2. Support up to sixteen (16) 1769 Compact I/O modules
- I. PLC system to be provided with controller, communication, chassis, and power supply as recommended by equipment manufacturer.
- J. PLC system shall be capable of stand-alone operation in the event of failure of the communication link to the OIT subsystem.
- K. Note, the programming/logic to accomplish the sequence outlined within this specification has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.
- L. The Programmable Logic Controller (PLC) shall be Allen-Bradley CompactLogix model 1769-L33ER with 1769 I/O modules. The County has standardized on Allen Bradley PLCs and no equal will be approved.

2.04 OPERATOR INTERFACE TERMINAL (OIT)

- A. Display:
 - 1. Display Type: Color active-matrix TFT
 - 2. Size: 10-inch
 - 3. Resolution: 1024 x 768, 18-bit color graphics

- 4. Touch Screen: analog resistive
- B. Operating System:
 - 1. Microsoft Windows CE with extended features and MS Office Viewers
- C. System Memory:
 - 1. 512 MB RAM, 512 MB nonvolatile storage for applications.
- D. External Storage:
 - 1. Secure Digital (SD) card, cat. no.1784-SDx
 - 2. USB flash drives supported by high-speed, hot-swappable, 2.0 USB host ports
- E. Battery (Real-Time Clock)
 - 1. Battery-backed time clock timestamps critical data. Accuracy +/-2 minutes per month
- F. Environmental Operating Temperature:
 - 1. 0 - 55°C (32 - 131°F)
- G. Ratings
 - 1. NEMA 12, 13, 4X, IP66 as classified by UL
- H. USB Ports:
 - 1. Two USB high-speed 2.0 host ports (type A) support removable flash drives for external storage
- I. Ethernet Ports:
 - 1. Two 10/100Base-T, Auto MDI/MDI-X Ethernet Ports that support Device Level Ring (DLR), linear or star network topologies
- J. Input Power
 - 1. 18-32V DC (24VDC nominal)
- K. Standard Software:
 - 1. Software FactoryTalk View Machine Edition software, version 7.0 or later
 - 2. FactoryTalk ViewPoint software, version 2.6 or later
 - 3. PDF viewer
 - 4. Active X Controls
 - 5. Remote Terminal Control

6. FTP Server

- L. Contractor responsible for providing their own programming software per manufacturer's recommendations to fulfill screen development and overall project intent. Software does not need to be turned over to the Owner as part of this project.
- M. The Operator Interface Terminal (OIT) shall be Allen-Bradley PanelView Plus 7 model 2711P-T10C22D8S, 10". The County has standardized on Allen Bradley OITs and no equal will be approved.

2.05 ETHERNET SWITCH/MEDIA CONVERTER

- A. To be furnished by the Owner and installed within control panel as part of this contract.
 - 1. Allow sufficient space within control panel to install Owner furnished switch.
 - 2. Communication shall be through Ethernet TCP/IP from the PLC CPUs to the County owned networking equipment.

2.06 BUBBLER SYSTEM

- A. Contractor to provide a complete air bubbler system (UL Listed) for monitoring levels of both chambers of the wetwell independently. The air bubbler and all associated appurtenances shall be installed within a dedicated enclosure as indicated on the Contract Drawings. A single bubbler system with split/valved tubing to each chamber of the wetwell is required.
- B. Wetwell level shall be measured by a pressure-to-current (P/I) transmitter located in the air bubbler panel. Major system components shall consist of the P/I transmitter, low pressure air supply, and two air-lines extending into and terminating near the bottom of each wetwell. An air selector valve shall be provided to allow either of the two wetwell levels to be monitored as well as monitor both wetwell levels at the same time. The air supply shall continuously purge the selected airline. P/I transmitter outputs shall be 4-20mA DC proportional to wetwell level and shall be connected to the station control panel PLC through an analog input. The JA-SCP shall utilize this signal for control, monitoring, trending, and alarming.
 - 1. Refer to Contract Drawings for dimensions/depth of wetwell. Contractor responsible for providing a system which monitors level over the entire range (empty - full). Typical of both wetwell chambers.
- C. Ancillary air bubbler system components shall include, but not be limited to, the following:
 - 1. Two (2) AC air compressors shall deliver free air from 1 to 4 scfm.
 - a. Air compressors shall be rated for use on a 120-volt, single-phase, 60 hertz power supply.
 - b. Provide automatic and timed cycle air tube purging
 - c. Provide automatic air tank moisture drain valve control

- d. Air compressor and system status indicators to be displayed on front panel.
 2. Control Module
 3. High accuracy pressure transducer (Air Tank & Bubbler Tube)
 4. Pressure gauge
 5. Level digital display
 6. Air flow indicators, Dwyer model RMA-5-SSV or approved equal
 7. Air compressor selector switch
 8. Wetwell airline selector switch, Parker XM40NBG553A or approved equal
 9. Purge valve, isolation valve, check valve, and relief valve as required.
 10. Calibration potentiometers
 11. Air piping from bubbler system to each chamber of wetwell
 - a. Utilize 3/8" stainless steel tubing and 1/2" schedule 80 PVC as indicated below.
 12. Two (2) 3" PVC air bells for installation within each chamber of the wetwell
 - a. Air bells to be shipped loose for Contractor installation within the field.
- D. Contractor to provide 3/8" air piping (stainless steel tube) from bubbler system control panel and transition to 1/2" schedule 80 PVC rigid pipe outside the control panel. Provide fittings to transition from 3/8" air piping to 1/2" PVC pipe. The 1/2" schedule 80 PVC pipe is to then be routed to each of the wetwell chambers. All tubing/piping to be sloped towards wetwell chambers to allow condensate drainage and tees shall be provided at all changes in direction. All wet well brackets, hardware and supports shall be 316 stainless steel. Contractor shall confirm air piping diameter with air bubbler system requirements. Refer to the contract drawings for additional information.
- E. Contractor to provide air bell within each wetwell chamber. Air bell to be comprised of 3-foot section of 3" schedule 80 PVC pipe. Provide necessary fittings to reduce/connect 1/2" PVC air pipe to the 3" air bell. Contractor to support/attach air bell to wetwell as well as support the 1/2" air piping. Utilize stainless steel pipe standoff supports within the wetwell for support/anchor every 24 inches. Refer to contract drawings for additional information.
1. Air bell to not be supported by 1/2" air pipe. Must be independently supported to wet well.
 2. Refer to Contract Drawings for dimensions/depth of wetwell. Contractor responsible for providing a system which monitors level over the entire range (empty - full). Provide suitably sized air bell. Typical of both wetwell chambers.

- F. Contractor to provide all necessary tubing, piping, valves, fittings, connectors, elbows, etc. to place in operation a complete and operable bubbler system for wetwell level monitoring (typical of each chamber of wetwell).
- G. Bubbler system to be model number 12138-2 as manufactured by Digital Control Company or approved equal.

2.07 SUBMERSIBLE PRESSURE TRANSDUCER

- A. The submersible pressure transducer shall be specifically designed for wastewater service and be certified intrinsically safe for hazardous locations.
- B. The transducer shall be non-fouling design incorporate a 4.10" PTFE isolated diaphragm with a 2.75" sensing area fitted to a rugged 316 stainless steel case.
- C. The sensor shall utilize silicon pressure cells fitted into the case with an integral, compliant stainless steel barrier diaphragm and have a 0.25% static accuracy.
- D. The transducer shall be 2-wire (22 AWG) design and produce a 4-20 mAdc signal linear to wetwell level. The conductors shall be encased in a polyurethane jacketed shielded cable with a polyethylene vent tube and Kevlar tension members. The cable shall have a 200 lbs. pull strength and be of enough length to reach the station control panel in a continuous run without splices.
- E. The transducer shall have a ½" MNPT conduit fitting to provide for mounting the transducer to a conduit or suspension kit.
- F. The transducer shall carry a lifetime surge protection warranty which shall include a din rail mount 24VDC surge protector for installation in the pump control panel.
- G. The level transmitter shall be provided with an aneroid bellows for transmitter vent tube termination. The bellows shall be mounted within a junction box. Refer to E-drawings for additional information.
- H. The level transmitter shall be provided with a weighted suspension kit consisting of a 1" stainless steel pipe (a minimum of 40" long) which shall be attached to the transmitter conduit fitting. The suspension kit shall be provided with 40' of 1/8" stainless steel cable and clamps to facilitate suspending the transmitter into the wetwell, while allowing it to be easily removed for service without entry into the wetwell.
- I. The transducer range shall be suitable for the operating range of the wetwell. Contractor to field verify and coordinate with the Owner.
- J. The level transmitter shall be TE Connectivity/Measurement Specialties model 750 or approved equal. Provide two (2) submersible pressure transducers, one for each chamber of the wetwell as specified and shown on the Contract Drawings.

2.08 BACKUP FLOAT CONTROL PANEL (BUFCP)

- A. Backup float control panel to be housed in a wall-mount NEMA 4X enclosure constructed of 14-gauge 304 stainless steel. The enclosure shall be provided with an inner swing-out panel for mounting of the float control mode pushbutton. The enclosure shall be sized per manufacturer's recommendations. The enclosure shall be Hoffman or approved equal. Refer to Contract Drawings for mounting location information.
- B. Control panel shall be UL 508A listed or UL 698A listed whichever is applicable. The UL "sticker" shall be clearly displayed in the appropriate location within the panel. Third party substitutions of UL 508A/698A listed equipment shall be strictly prohibited.
- C. Panel Input power shall be 120VAC, 1 Phase, 60Hz. Provide a sufficiently sized main circuit breaker disconnecting means. Interlock main circuit breaker disconnect with the control panel door handle.
- D. Refer to Electrical Drawings for additional information/requirements.
- E. A 120VAC single phase surge protector shall be provided for the incoming 120VAC supply. The surge protector shall be designed to protect electrical and electronic equipment against transients caused by lightning, induction, load switching, EMP and other sources. Line to neutral, line to ground and neutral to ground protection shall be provided. The surge protector shall have a protection level of 1kV and a maximum discharge current of 140 kA as a minimum. The surge protector shall have a remote signaling device for fault indication to the PLC. The AC surge protector shall be CITEL model DS72RS-120 or approved equal.
- F. One print pocket shall be provided on the control panel door. One complete set of electrical control drawings shall be provided in the pocket.
- G. The control panel shall provide with a pushbutton to activate and deactivate float control mode. Pushbutton shall be 30mm, industrial grade, Allen-Bradley 800H series or approved equal.
- H. The control panel shall provide visual indication the system is operating in float control mode via pilot light. Pilot light shall be 30mm, industrial grade, push-to-test type, Allen-Bradley 800H series or approved equal.
 - 1. Color coding for equipment status, pilot lights, and alarms shall be as follows:
 - a. Green for on, open, or running
 - b. Red for off, closed, or stopped
 - c. Amber for indication of malfunction, trouble, or alarm
 - d. Blue for indication of electrical power on

- I. AC power fuses shall be provided as required for over current protection of individual AC powered panel components. Single circuit fusible terminal blocks with neon blown fuse indicators suitable for use with ¼" x 1 ¼" glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 100 to 300VAC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H4 or approved equal.
- J. DC power fuses shall be provided as required for over current protection of individual DC powered panel components. Single circuit fusible terminal blocks with LED blown fuse indicators suitable for use with ¼" x 1 ¼" glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 10 to 57V AC/DC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H5 or approved equal.
- K. Interposing and control relays shall be provided as required. They shall be of industrial grade, plug-in socket type, and shall have 24VDC or 120VAC coils and 2PDT or 4PDT form C relays as required. All relay contacts shall be silver nickel plated, 2PDT relay contacts shall be rated for 10A at 300VAC and 4PDT relay contacts shall be rated for 7A at 300VAC. All relays shall be provided with a standard ON/OFF flag indicator, mounting base and retainer clip. Control relays shall be Allen-Bradley series 700-HC or approved equal.
- L. Control panel to be provided with time delay relays to allow for stagger starting pumps. Refer to below sequence for additional information.
- M. Screw type terminal blocks shall be provided for all field connections, wiring field equipment directly to PLC I/O bases or other panel components is not acceptable. Terminal blocks shall have the following electrical ratings as a minimum:
 - 1. Two Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 20 Amp
 - c. Wire Size Range: 30-12 AWG
 - 2. Three Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 10 Amp
 - c. Wire Size Range: 26-14 AWG
 - 3. Terminal blocks shall be Allen-Bradley series 1492 or approved equal.

- N. The control panel shall be completely factory assembled, wired, configured, and tested prior to being shipped to the project site.
 - 1. The Engineer shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture.
 - 2. The Contractor shall make all arrangements and pay for all travel and expenses for up to three people from the Owner and Owner's Engineer to witness the shop tests.
- O. The BUFCP shall be provided with intrinsically safe barrier(s) for the float switch inputs. All Intrinsically safe wiring shall be separated from other wiring by a distance of at least 2 inches, secured from conductors and cables of non-intrinsically safe circuits. Physical barriers shall be installed where required to prevent intrinsically safe circuits from encountering non-intrinsically safe circuitry.
 - 1. Refer to below article for float switch specifications.
- P. BUFCP to be completely independent of the PLC based control to serve as redundant control in the event of a PLC failure, power supply failure, primary level detection system failure, etc.
- Q. Sequence of operation notes:
 - 1. BUFCP shall always be ready when powered on. System to activate and take control of pump control in the event of a PLC failure, bubbler failure, or transducer failure.
 - 2. When float control mode is enabled (via trigger of high-high level float or panel pushbutton) PLC control is prohibited.
 - 3. BUFCP to interface with influent pump starters. Refer to electrical drawings for additional information/requirements.
 - 4. When activated by the high-high level float all pump control floats will be activated. Adjustable time delay relays shall be provided to stage on each pump to prevent multiple pumps from coming on at one time. The highest pump control float, pump 4 shall have the shortest delay and therefore will come on first. Pump 3 shall have a longer delay and come on next providing pump 4 has not pumped the level down below the pump 3 control float. The sequence continues for all 4 total pumps. All operating pumps shall continue to run until the all pumps "OFF" float is reached. All pumps shall remain off until level once again rises to the pump 1 control float.
 - 5. After the initial pump down cycle, individual pumps run when the respective float is re-activated.
 - 6. The BUFCP remains in control of the pumps until an operator visits the BUFCP and physically depresses the float control off pushbutton.

2.09 WET WELL FLOAT SWITCHES

- A. Float switch shall be of the direct acting type, containing a single pole non-mercury switch, which actuates when the longitudinal axis of the float is horizontal, and deactivates when the liquid level falls 1" below the actuation elevation.
- B. Each float shall be housed in a chemical resistant polypropylene casing with a firmly bonded electrical cable protruding. One end of the cable shall be permanently connected to the enclosed switch with the entire assembly encapsulated to form a completely watertight and impact resistant unit, provide enough cable length as required to reach the backup float control panel as indicated on the Contract Drawings.
 - 1. Provide sufficient cable length to enable floats to be removed from one wetwell chamber and installed within the second chamber.
- C. Float switches shall be suitable for low-current operation compatible with intrinsically safe barriers and/or PLC inputs.
- D. A coated steel anchor assembly with stainless steel chain and float clamps shall be provided for installing the float switch as indicated on the Contract Drawings. Float switches to be installed along wetwell dividing wall with sufficient cable length to allow installation within either wetwell chamber (or either side of divider wall). Contractor to field verify.
- E. Float switches to be wired as inputs to the Backup Float Control Panel (BUFCP). Refer to electrical drawings for additional information.
- F. Float switches shall be Flygt model ENM-10 or equal. Typical of six (6) float switches required. Refer to the Contract Drawings for additional information.

2.10 MAGNETIC FLOW METER

- A. The Contractor shall furnish and install, ready to operate, the magnetic-type flow metering equipment, complete with flow tube, remote mounted flow transmitter, interconnecting cables and all necessary accessories, in compliance with the following specifications and as shown on the Contract Drawings.
- B. Contractor to provide a total of one (1) magnetic flow meter and associated remote transmitter. Unit to be utilized with an associated 14" Ductile Iron pipe size and be suitable to measure a flow range of 0 - 2,500 gallons per minute.
- C. Contractor is responsible to verify with the supplier that the appropriate ratings and options are provided for each application, taking into account area classification, flow, passing media, temperature, and vacuum limitations. Any such deviation from that which is specified shall be brought to the Engineers' attention during shop drawing submittals.
- D. Contractor to coordinate necessary factory/interconnect cable length between flow tube/element and remote flow transmitter.

- E. Produce a pulsed DC magnetic field that, when applied to a conductive liquid, generates an induced voltage as the liquid flows through the magnetic field. Generate voltage directly proportional to the flow of the metered liquid. Identify the ratio of flow velocity to voltage generated for all meter sizes, thereby permitting primary head and transmitter direct adaption and interchangeability without circuit modifications or system recalibration.
- F. Flow Element Design:
1. Flow elements shall be magnetic flow tubes, low frequency electromagnetic induction type and shall produce a 4-20 mA output linear to liquid flow rate.
 2. The flow tubes shall have ANSI Class 150 flanged ends. Wafer-style flow tubes are not acceptable.
 3. The flow tube material shall be 304 stainless steel.
 4. Electrodes shall be conical-shaped (bullet nose) and shall be Type 316L stainless steel, Hastelloy C, or Zirconium. Substantiate compatibility with media monitored in the shop drawing submittal.
 5. The flow tube housing shall be splash-proof and weather-resistant. It shall be capable of accidental submergence in up to 30 feet of water for up to 48 hours without damage to the electronics or interruption of the flow measurement.
 - a. Flow tube shall be provided with potted junction box and combo/cable gland for use in conduit as indicated on drawings. Contractor to assume 100 linear feet of cable for bidding purposes. Final cable length to be coordinated in the field.
 6. Empty Pipe Detection - Flow tube shall measure the conductivity between the electrodes to monitor for an empty pipe condition. Upon detection of an empty pipe condition, the flow transmitter shall indicate the pipe is empty on the main transmitter display and drive the flow signal to zero.
 7. Grounding Rings:
 - a. Provide two grounding rings installed on each end of the flow tube. Ground rings to be 316L stainless steel. Contractor to bond ground rings together to grounding lug on housing of flow tube using #4 bare copper conductor.
- G. Flow Transmitter Design:
1. Signal converters shall be wall mounted, housed in a NEMA 4X enclosure. Provide sunshield for enclosure as transmitter is to be installed in an exterior atmosphere.
 2. Terminal strips for electrical connections shall be supplied. Housing shall not need to be opened to make adjustments.
 3. Transmitter (Converter) Electronic Characteristics
 - a. The electronics shall be of the solid-state, feedback type and utilize integrated circuitry.

- b. The input span of the signal converter shall be continuously adjustable between 0 to 1 and 0 to 31 fps and the range adjustment shall be direct reading.
- c. Complete zero stability shall be an inherent characteristic of the meter system to eliminate the need to zero adjust the system with a full pipe at zero flow.
- d. The converter shall not be affected by quadrature noise nor shall it require zero adjustment or special tools for startup.
- e. Input and output signals shall be fully isolated.
- f. Outputs:
 - 1) 4-20 mA into 500 ohms, providing 50 megohms of isolation from ground, and isolated from the transmitters power supply. Minimum of 250 ohms is required for HART communicator.
 - 2) Pulse output with minimum time duration of 0.5 seconds.
- g. The electronics shall be designed for operation on 120 VAC +10 percent, 60 Hz +5 percent.
- h. The converter shall also include:
 - 1) Integral zero return based upon a user-adjustable percentage of flow meter span. Setpoint shall be adjustable 0 to 10 percent.
 - 2) Direct adjustment of scaling factor in Engineering units.
 - 3) Integral calibration self-test feature to verify proper operation at the electronics.
 - 4) Local direct reading indicator calibrated in gallons per minute or million gallons per day as directed by the Engineer. Flow totalizer with manual reset.
- i. Each meter shall be hydraulically calibrated to the specified flow range in a NIST-certified facility.

H. Performance Requirements:

- 1. The equipment furnished shall measure, indicate, and transmit flow rates to within +0.5 percent of actual flow from a flow velocity of 1.0 to 31 fps.
- 2. Accuracy shall not be affected by changes in percent solids or changes in fluid density, temperature, or viscosity. Accuracy shall not be affected by the presence of air bubbles to a greater extent than the fluid volume represented by such air bubbles.
- 3. Maximum power consumption for each flow element shall be 15 watts.
- 4. Equipment design specifications shall be considered as an integral part of the performance requirements.

I. Accessories:

1. Nameplates – Provide nameplate, wording of nameplate shall be as identified on the contract drawings (device tag).
2. Mounting Hardware - Provide stainless steel mounting hardware as necessary to mount equipment in locations as described in the Contract Documents.
3. Cabling - Provide power and signal circuitry as specified and as shown on the Contract Documents.
4. Flow tubes shall be provided with grounding rings on each flange. Grounding electrodes or straps are not an acceptable alternative. Materials of construction shall be Type 316L stainless steel, Hastelloy C, or Zirconium as chemically compatible with the measured media.

J. The flow metering equipment manufacturer and model shall be the following or equal:

1. Emerson/Rosemount 8750W with remotely mounted 8712E transmitter for utility, water, and wastewater applications.

2.11 PRESSURE TRANSMITTER

A. Operational

1. Input range: As required
2. Output: 4-20 mAdc, 2-wire, linear and proportional to level
3. Power Supply: 10-36 VDC externally loop powered

B. Performance

1. Accuracy: 0.25% of full scale, including the effects of linearity, hysteresis, and repeatability.
2. Process temperature range: -22 to 248°F
3. Ambient temperature range: -13 to 185°F
4. Maximum working pressure: Two times full range

C. Construction

1. Housing: NEMA 4X Stainless Steel

D. Accessories:

1. Transducer to be provided with factory installed carbon steel/PVC isolation diaphragm with low temperature silicone fill, for lightning and surge protection.

E. Pressure transducer to be Rosemount 3051 Pressure Transmitter or approved equal. Typical of one (1) pressure transmitter required.

2.12 CHART RECORDER

- A. The Contractor shall furnish and install, ready to operate, a single chart recorder, complete with all necessary accessories, to record flow & pressure (analog signals) as specified herein and shown on Contract Drawings.
- B. General:
 - 1. Microprocessor based
 - 2. Minimum 12-inch circular chart with 10 mm calibrated width.
 - 3. Digital display – 40 character, two line display.
 - 4. Digital accuracy of 0.02 percent of operating span.
 - 5. Input resolution of 0.01 percent of operating gain span.
 - 6. Pen position resolution of 0.2 percent of chart range
 - 7. Channel update, each channel scanned every 500 msec.
 - 8. Display accuracy of 0.02 percent of operating gain span
 - 9. Output isolation
 - 10. Input isolation
 - 11. Operating voltage of 120VAC
 - 12. Analog inputs – one for each pen
- C. Pen offset for all pens, configurable in any formation.
- D. Integral analog signal re-transmission for each analog input provided.
- E. Provide five hundred (500) 12-inch thermal sensitive charts.
- F. Provide as two (2) pen configuration for monitoring/trending both flow and pressure.
- G. Provide as ABB, Commander 1900R or approved equal.

2.13 AUTO-DIALER

- A. Provide telephone alarm dialer for remote annunciation of system alarms at the pump station. The dialer enclosure shall be NEMA 1 (located integral to station control panel), with integral LED display and keypad. Auto-dialer to have the following features at minimum:
 - 1. Integral LED display and keypad.

2. The dialer shall include an integral battery and associated charger to provide 20-hour operation during power outages. All the dialer's inputs including power supply, telephone line and alarm inputs shall be individually surge protected. The dialer shall be capable of synthesizing the operator's own voice messages and will be capable of monitoring thirty-two (32) discrete inputs plus 120VAC power source. The dialer shall be capable of calling up to thirty-two (32) phone numbers, independently programmable to any or all the alarms.
3. Programmable functions such as independent time delay before calling out, time between consecutive calls and alarm input sense that is normally open or normally closed, shall be inherent.
4. All voice messages and functions will be programmable locally via the dialer's integral keypad or remotely via telephone communications. Security codes (up to 8 digits) shall be programmable to prevent unauthorized access to the dialer's configuration.
5. The alarm dialer shall be modular in design, allowing future expansion of discrete input channels, analog input channels, and remote supervisory control outputs.
6. The alarm dialer shall have a five (5) year parts and labor warranty.
7. Provide expansion card as required to monitor 32 inputs.
8. Coordinate with the Owner for which alarms/signals are to be incorporated in the proposed auto-dialer. Contractor to program the dialer as required. For bidding purposes assume the following list of alarms are to be integrated/hardwired into the auto-dialer:
 - a. Pump 1 failure (relayed thru soft starter)
 - b. Pump 2 failure (relayed thru soft starter)
 - c. Pump 3 failure (relayed thru soft starter)
 - d. Pump 4 failure (relayed thru soft starter)
 - e. Wetwell low-low condition (from backup float system)
 - f. Wetwell high-high condition (from backup float system)
 - g. Backup float control on (from backup float system)
 - h. Station intrusion detected (from JA-SCP – discrete output)
 - i. PLC failure (from JA-SCP – discrete output)
 - j. Bubbler system failure (from JA-SCP – discrete output)
 - k. Submersible pressure transducer failure (from JA-SCP – discrete output)
 - l. Ventilation system failure (from JA-SCP – discrete output)

- m. Wetwell high level condition (from JA-SCP – discrete output)
 - n. Drywell flood alarm (from JA-SCP – discrete output)
 - o. Utility power failure (from JA-SCP – discrete output)
 - p. Wetwell low level condition (from JA-SCP – discrete output)
 - q. Generator running (from JA-SCP – discrete output)
 - r. Gas detection low/high concentration (from JA-SCP – discrete output)
 - s. Gas detection system failure (from JA-SCP – discrete output)
 - t. Fire Alarm Detection (From fire alarm relay panel)
9. The alarm dialer shall be RACO model 304VSS-32C. The County has standardized on RACO auto-dialers and no equal will be approved.
- a. Provide with 345VDCA-1 Verbatim Daughter Card Assembly Option
 - b. Provide with 460VSCADA Verbatim SCADA Card Option
 - c. Provide with 360V4A-1E/4-20MA analog signal input option.
- B. Provide two (2) days of manufacturer representative startup and training services. Intent is to test, troubleshoot, and aid in the installation of the auto-dialer system.
- C. Provide internal to station control panel.

2.14 SPARE PARTS

- A. The following spare parts shall be provided:
- 1. One (1) PLC CPU of each type
 - 2. One (1) PLC power supply of each type
 - 3. One (1) PLC I/O module of each type
 - 4. One (1) 24VDC panel power supply of each type
 - 5. Two (2) surge protectors of each type
 - 6. Five (5) fuses of each type
 - 7. Five (5) pilot light bulbs of each type
 - 8. Five (5) miniature circuit breakers of each type/size
 - 9. One (1) AC air compressor (used for Bubbler System)
 - 10. One (1) pen for specified chart recorder

11. One (1) set of backup floats (6 in total)

2.15 I/O TABLE

- A. The below I/O table is to provide systems integrator with a general idea of I/O quantity. I/O table below lists all signals remote from JA-SCP. Typical signals internal to JA-SCP components (such as UPS failure/low battery, power supply failure, etc.) to be included with overall I/O counts (not listed below for clarity). Refer to contract drawings, specifications, and coordinate with Owner/Engineer for final I/O counts. In addition, refer to above auto-dialer article for various PLC outputs to the auto-dialer. Refer to quality assurance section above for control panel spare capacity requirements.

Equipment	Function	Signal	Homerun
JA-IP-1 Soft Starter Influent Pump 1	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
JA-IP-2 Soft Starter Influent Pump 2	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
JA-IP-3 Soft Starter Influent Pump 3	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
JA-IP-4 Soft Starter Influent Pump 4	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
Influent Pump/Motor 1 (Relayed thru Soft Starter)	Motor Winding High Temperature	Discrete Input	JA-SCP
	Pump Seal Leak	Discrete Input	
Influent Pump/Motor 2 (Relayed thru Soft Starter)	Motor Winding High Temperature	Discrete Input	JA-SCP
	Pump Seal Leak	Discrete Input	
Influent Pump/Motor 3 (Relayed thru Soft Starter)	Motor Winding High Temperature	Discrete Input	JA-SCP
	Pump Seal Leak	Discrete Input	
Influent Pump/Motor 4 (Relayed thru Soft Starter)	Motor Winding High Temperature	Discrete Input	JA-SCP
	Pump Seal Leak	Discrete Input	

Equipment	Function	Signal	Homerun
Bubbler System	Primary Level Control	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
LSH-1 Drywell Flood/Water	Alarm	Discrete Input	JA-SCP
LSH-2 Influent Rm. Flood/Water	Alarm	Discrete Input	JA-SCP
LE-1 Pressure Transducer Wet Well 1	Secondary Level Control	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
LE-2 Pressure Transducer Wet Well 2	Secondary Level Control	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
Gas Detection Panel	Combustible Gas (LEL) Concentration Level	Analog Input	JA-SCP
	Oxygen (O2) Concentration Level	Analog Input	
	Hydrogen Sulfide (H2S) Concentration Level	Analog Input	
	Carbon Monoxide (CO) Concentration Level	Analog Input	
	Common Failure Indication	Discrete Input	
Gas Detection Alarm Relay Cabinet	Gas Detected / Alarm	Discrete Input	JA-SCP
BUFCP Backup Float Control Panel	LS-HH-1 High-High Level	Discrete Input	JA-SCP
	LS-LL Low-Low Level	Discrete Input	
	Float Control Mode Active	Discrete Input	
Emergency Generator System	Running	Discrete Input	JA-SCP
	Common Failure	Discrete Input	
	Low Fuel	Discrete Input	
	Fuel Leak	Discrete Input	
Chart Recorder	Flow	Analog Output	JA-SCP
	Pressure	Analog Output	
Ventilation Alarm Relay Cabinet	Supply Fan Fail	Discrete Input	JA-SCP
	Exhaust Fan Fail	Discrete Input	
Dry Well Entry Door	Door Contact	Discrete Input	JA-SCP
Electrical Room Entry Door 1 (Single Door)	Door Contact	Discrete Input	JA-SCP
	Door Contact	Discrete Input	JA-SCP

Equipment	Function	Signal	Homerun
Electrical Room Entry Door 2 (Double Door)	Door Contact	Discrete Input	
Wet Well Entry Door	Door Contact	Discrete Input	JA-SCP
Wet Well Hatch	Door Contact	Discrete Input	JA-SCP
FE/FIT-1 Flow Meter	Flow	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
PIT-1 Pressure Transmitter	Pressure	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
Fire Alarm Relay Panel	Smoke Detector Alarm	Discrete Input	JA-SCP
	Heat Detector Alarm	Discrete Input	
Drywell Ventilation Control Panel	Supply Fan Running	Discrete Input	JA-SCP
	Supply Fan Fail	Discrete Input	
	Exhaust Fan Running	Discrete Input	
	Exhaust Fan Fail	Discrete Input	
Wetwell Ventilation Control Panel	Supply Fan Running	Discrete Input	JA-SCP
	Supply Fan Fail	Discrete Input	
	Exhaust Fan Running	Discrete Input	
	Exhaust Fan Fail	Discrete Input	
ATS Three Phase Monitor	ATS Normal Switch Position	Discrete Input	JA-SCP
	ATS Emergency Switch Position	Discrete Input	
Auto-Dialer	Refer to Auto-Dialer Article Above		JA-SCP
Telemetry Control Panel	Communication Link	Ethernet	JA-SCP

PART 3 EXECUTION

3.01 INSTALLATION

- A. When a change from normal power to emergency power occurs and vice versa all equipment to be restarted automatically. Final requirements to be coordinated with the Engineer. Provide as required.
- B. Install equipment at locations indicated on the drawings.
- C. Provide all necessary cable, conduits, and fittings as required to provide a fully operable system. All wiring external to control panels shall be in conduit or sealtite. Refer to the raceway schedule on the contract drawings for additional information/requirements.
- D. Refer to the contract drawings for all field wiring specifications/requirements.

- E. Coordinate all circuitry (conduit & conductor) requirements closely with the electrical drawings and specifications (Division 16).
 - 1. Contractor to provide/install all circuitry from control panel to control panel and from control panel to equipment/devices per the Contract Drawings. As part of this specification all wiring is to be terminated within the applicable control panel. Electrical trade to install the wire and this contract is to terminate all wiring within the specified control panel, as necessary.
- F. Point test all PLC I/O to verify that all I/O modules are correctly wired to the terminal strips and that the PLC I/O modules function properly. Testing shall be performed between terminal points on the I/O module to the terminal strip that the field device is terminated on.
- G. Contractor to perform point-to-point wire testing on all circuitry entering/leaving the JA-SCP. Verify wire integrity, continuity, and proper transmission of signal. Close coordination with electrical trade required.

3.02 GRAPHIC DISPLAYS/SCREEN DEVELOPMENT

- A. Systems integrator responsible for developing all screens associated with each control panel specified as part of this section and loading onto control panel as required. Coordinate with the Owner and Engineer.
 - 1. Note, the programming/logic to accomplish the sequence outlined within this specification has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.
 - 2. In similar fashion the County has specific OIT standards that need to be adhered to while developing the graphics and screens. Final requirements to be outlined during the coordination meetings specified above. The below outline to serve as a basis for bidding purposes.
 - 3. Programmer to conform to all requirements set forth in the latest copy of Westchester County's SCADA programming standards. Coordinate final requirements closely with the Owner/county.
- B. General Requirements:
 - 1. All displays shall contain and continuously update the displayed process variables, date, and time of day. All process values shall be displayed in Engineering units. All displays shall incorporate references to both instrumentation tag numbers and plant equipment numbers. All process variables shall be displayed on their associated display(s) with correct Engineering units. Process variables shall display their associated data quality flags.
 - 2. All operator commands related to controlling field devices or system attributes shall require multiple keystrokes or mouse actions to protect against inadvertent operations. The operator shall receive confirmation of the selected point to be controlled, at which time a cancellation of the control can be affected.

3. Process graphic displays, shall be based on the P&ID's, site plan drawings, mechanical drawings and electrical drawings included as part of these Contract Documents. The graphic displays shall depict process flow streams, process structures, and all major items of process equipment and control devices in a schematic format.
4. All main graphical screens shall include a title bar, main graphic area, navigational buttons, and alarm summary bar. Title bar shall be displayed on the top of each screen and include display name, description, and time/date. The main graphical area shall contain primary screen data in graphical format. Navigational buttons shall include a minimum of main menu, trends, main alarm summary, and security log in. The alarm summary bar shall display the last three valid alarms on the bottom of each screen.
5. Animation shall be provided to mimic level changes in tanks or vessels, and to mimic rotation of rotating equipment when running. Valve colors shall change when opened and closed.
6. Unless specifically noted, all timers, setpoints, alarm actuation levels, etc., shall be adjustable from the operator interface.
7. The system shall show field conditions with text that can alternate (i.e., OPEN/CLOSE, START/STOP, HIGH/LOW) and change color correspondingly. Field devices that are tri state must be represented in three conditions.
8. Conditions in the field designated as alarm conditions shall report to the operator workstation, actuate an audible alarm, and provide a visual blinking image on the associated graphic page. All alarms and events shall be displayed on the screen and archived.
9. All interlocks that affect equipment operation shall be identified both by alarm and by OIT indication.
10. All analog inputs shall be checked for out of range (via high and low limit checks) and alarmed.
11. All process flow streams shall be labeled and color coded. All structures and equipment shall be identified by name and appropriate equipment and loop tags.
12. Color coding for equipment status, pilot lights, and alarms shall be as follows:
 - a. Green for on, open, or running
 - b. Red for off, closed, or stopped
 - c. Amber for indication of malfunction, trouble, or alarm
 - d. Blue for indication of electrical power on

13. Automatically record all alarm and events should any of the following sequences or events occur:
 - a. Date/Time entry
 - b. Limit changes
 - c. Any commanded or un-commanded change of any point
 - d. Alarm conditions
 - e. PLC activation or deactivation
 - f. Operator login or logout activity

C. Specific Requirements:

1. Water overview screen shall include a site plan representation, indicating the geographic location of each process, and each building.
2. Main menu screen shall be developed to link to all screens and process areas. The screen shall be a complete and logical listing of the names and number of all screens
3. Overall plant process block flow diagram screen shall show all major processes in block form with flow arrows. Each block shall include a text description of key individual treatment processes. Navigational buttons to the individual treatment processes shall be performed by pressing on the text description.
4. Individual treatment process screens shall graphically screen key process variables and equipment. No operator entries shall be done from these screens. Individual process flow screens for each process shall include all process components, including tanks, pumps, blowers, mixers, drives, flow meters, valves, mechanical devices, as well as manual shutoff and isolation valves. These diagrams shall be generally depicted from the contract drawings and there shall be at least 1 screen per contract drawing on average.
5. Individual unit process screens depicted from the contract drawings are used for control and screen of each major item of process equipment, process variables, and control devices, including pumps, blowers, valves, gates, mixers, drives etc. Navigational buttons shall consist of the contract drawing flow arrows to other individual unit processes. The unit process screens shall provide the ability for the operator to go to individual equipment popup screens. These diagrams shall be generally depicted from the drawings and there shall be at least 2 screens per contract drawing on average.
6. Popup screens shall be provided for each piece of equipment to start/stop equipment, open/close valves, implement automatic control, adjust set points, establish, and adjust tuning parameters, set alarm limits, and initiate a sequence.
7. PLC system diagnostic screens, showing the operational status, and fault conditions of all PLC components, including processors, I/O modules, OIT's, power supplies and UPS units.

8. Communications diagnostic screens, showing the details of network status, communications status of all major components including Operator Workstations, peripheral devices, and network components.
9. Maintenance screens shall screen the raw value for each analog and digital I/O point in the system. They shall also allow the operators/maintenance personnel to enter an override value for an analog point that is then used by the system instead of the value read from the input card / communications link.
10. Trend screens with the capability to screen up to eight, operator assigned, analog and/or digital process variables. Each analog value will be shown on a trend screen.
11. Main alarm summary screen shall screen the following information on each alarm: Time, tag name, description, alarm type, current value, and status. An acknowledge alarm button shall acknowledge all new unacknowledged alarms. The acknowledged and unacknowledged alarms shall be different colors. Acknowledged alarms shall clear automatically after the condition is corrected.
12. Analog variable screens showing a tabular summary of all plant process variables, in operator assigned groupings.

D. Security:

1. The system shall be configured and implemented with security to prevent unauthorized access. The system shall allow authorized changes to system operation through defined user accounts and password verification.
2. Coordinate with Owner user account information, including login name and password for each account.
3. Security levels of "display only", "operator mode", "supervisor mode", and "Engineer mode" shall be available through assignable passwords. On system startup, the "display only" security level shall automatically be entered. In the "display only" mode, information is available to be displayed on the screen, but no changes may be made. In the "operator mode", changes may be made to process set points, times, etc.; however, the overall control concepts may not be modified. In the "supervisor mode", all operator functions can be modified, and any special reports or critical process set points (data can be modified; however, the overall control concepts may not be modified). In the "Engineer mode" level, all user modifiable parameters of the system shall be available for modification.

E. Alarm/Equipment Status Reporting:

1. The alarm log shall display all alarms as they occur. The alarm message shall include the time of occurrence, tag name, tag number, and whether it is a low, high, or failure alarm. When the point in alarm returns to normal, the time, point identification number, and return to normal shall be displayed. All reports shall include the plant equipment number of the associated device.
2. The equipment status shall be logged whenever a change in status occurs (i.e., start, stop). The equipment status log shall include the time, equipment name, tag number, and the change in status.

F. Historical Data Management:

1. Each system point (analog or digital, real or pseudo) shall have the capability of being historically logged. A point shall have the capability of being deleted from historical log at any time. It shall be easy to add or delete system points using minimal keystrokes.
2. All process analogs and all flow totals and run time indications of all primary process equipment motors shall be sampled and stored in the historical data management system.
3. Data Processing: The real time instantaneous values shall be stored in a historical log file on the hard disk at defined sampling rates.
4. Data Correction: Historical data shall be manually modifiable by personnel with appropriate security levels. Such data shall be differentiated from actual monitored values on reports, in the database and in trends.
5. Data Quality: Data Quality flags shall propagate to the next higher level of the history based on user selectable percentage determining tolerance levels for averages and totals. If the percentage of suspect data exceeds the tolerance level, the suspect data flag propagates to the next higher level. Maximums and minimums shall be taken from good data.
6. Manual Input Data Handling: This data shall consist of additional values not obtainable by the system such as laboratory analysis for use in reports. All manually entered data shall be entered and stored in the appropriate Engineering units. All data entered shall be displayed for confirmation on the display prior to incorporation to the database.

3.03 START-UP SERVICE

- A. The system integrator/supplier shall provide the services of a qualified service technician/Engineer to perform the following service duties.
1. Provide a minimum of two (2) days on-site services to provide installation instruction to the contractor on all aspects of equipment installation.
 2. Provide a minimum of three (3) days of onsite startup services to provide a final system calibration, programming, and testing after completion of equipment installations.
 3. Provide a minimum of two (2) 4-hour session at the job site to provide instruction to facility personnel in the operation, proper maintenance, trouble shooting, and repair of the equipment. Contractor to demonstrate proper operation of system to Owner.
 4. Following system startup, contractor is to correct any deficiencies at no additional cost to the Owner.

- B. Following completion of the above services, the supplier shall provide an affidavit to the facility, certifying that the system is installed and operating in accordance with the contract documents.

END OF SECTION

SECTION 17650

GAS DETECTION

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Contract Drawings and general provisions of contract, including General and Supplementary Conditions, Division 1 and all of Division 16 Specifications, apply to this section.

1.02. SUBMITTALS

- A. Submit all product and system data.
- B. Submit shop drawings and product data for all equipment covered in this specification including:
 - 1. Complete assembly, schematic, and installation drawings.
 - 2. Descriptive information on materials and equipment furnished.
 - 3. Complete drawings and wiring diagrams.
 - 4. Complete product data
 - 5. Performance data.
 - 6. Furnish O&M Manuals.
 - 7. Warranty information.
 - 8. Point to point wiring diagrams

1.03. GENERAL REQUIREMENTS

- A. It is a requirement of this specification that the elements of the system be provided by a single supplier. This supplier shall have total responsibility for the entire system performance and compatibility of this section.
- B. For ease of identification, equipment tags for the various components of the gas monitoring system to be furnished are depicted on the Contract Drawing Riser Diagrams and Floor Plans.
 - 1. Provide labeling for each device/control panel as called for and shown on the Contract Drawings.
- C. Equipment to be UL listed.

1.04. SCOPE OF WORK

- A. Provide and install a gas detection system complete with sensing devices, transmitter, displays, calibration equipment, alarm/horn stations, conduit and wire, control panel, sample pumps, tubing, and manufacturer's cable as follows and as shown/specified on the Contract Drawings. Typical of one (1) system as shown on the Contract Drawings.
 - 1. Jackson Ave. Pump Station (gas sampling system with remote alarm light/horn stacks).
- B. Refer to Contract Drawing Riser Diagrams and Floor Plans for device quantities, equipment tags, and additional information.
- C. Sensors shall monitor for combustible gas (LEL), hydrogen sulfide (H₂S), oxygen depletion (O₂), and carbon monoxide (CO). Control panel to include four (4) internal sensors.
 - 1. Range of devices to be as follows:
 - a. LEL: 0-100% LEL
 - b. H₂S: 0-50 PPM
 - c. O₂: 0-25%
 - d. CO: 0-100 PPM
- D. Provide as-built drawings upon completion of installation.
- E. Provide two year full replacement warranty on all equipment as part of this specification section. Warranty shall replace, with new (not refurbished) equipment. Warranty duration shall commence on the date of substantial completion. Submit warranty information during submittal phase.
- F. Provide commissioning services, startup services, and training services.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. The gas detection systems shall be the following or approved equal:
 - 1. Mine Safety Appliance (MSA) MultiGard 5000 Gas Sampling System.
 - a. Provide as part # A-MG5000-D-B-D-B-B-A-AA-B-B.
 - b. Provide unit with sampling pumps, tubing, 4-sensors, etc. for a complete and operable gas monitoring system.

B. Note for reference, a distributor of the above equipment is as follows:

1. Applied Measurement and Control
1246 Commercial Drive, B01
Farmington, NY 14425
Phone: 585-398-7260
sales@appliedmc.com

2.02. EQUIPMENT DESIGN

A. Gas Sampling System

1. General - The monitoring system shall draw, via an internal pump, gas samples to the internal analyzer(s) from up to 32 locations and sequentially measure the gas concentration. The system shall provide visual alarm indication when preset levels are exceeded. Relay outputs for the purpose of external alarm or control shall be provided. Gas concentrations and alarm settings can be exported to a flash drive into a .CSV format.
2. The system shall consist of the following three sub-systems, all of which are to be mounted in a single enclosure:
 - a. System Controller
 - b. Gas Sample Handler
 - c. Four Sensors (LEL, H2S, O2, CO)
3. Enclosure shall be NEMA 1 rated.
 - a. Access Door - A full length front access door shall be provided.
 - b. Electrical Entry - A gasketed, removable plates shall be provided in the enclosure bottom for purposes of providing electrical entry
 - c. Sample Tubing Connection - NPT fittings suitable for the connection of 1/4" OD, 3/16" inch ID tubing shall be provided on the sides of the enclosure for the purposes of connection, sample lines, calibration gases and exhaust.
 - d. Indicators - An impact resistant 10" diagonally measured color TFT touchscreen Display for gas sample systems shall be provided on the access door of the enclosure for the purpose of viewing all operational parameters of the unit.
 - e. Mounting - Brackets suitable for wall mounting shall be provided.
 - f. Controls - There shall be no switches, levers or buttons on the front cover of the unit. The operator interface to the unit shall be via the soft buttons on the front panel display. These soft buttons are activated by touching the front panel display screen.

4. Controller

- a. Type - The controller shall be an Allen-Bradley (AB) CompactLogix Logic Controller.
- b. Programmable Functions - All programmable functions will be entered via the soft keys on the front panel touch screen. The following functions shall be programmable:
 - 1) Sequencing point order
 - 2) Manual calibration sequence
 - 3) Automatic standardization, sequence and associated timing parameters and adjustment limits.
 - 4) Parameters for the common alarm relays:
 - a) latching or non-latching alarm function
 - b) upscale or down scale acting alarms
 - c) fail safe or non-fail safe relay operation
 - d) On delay relay operation
 - e) Off delay relay operation
 - 5) Removal or skipping of any location from the sampling sequence
 - 6) Setting Trouble, Warning and Alarm trip point levels per sampling point per analyzer or sensor
 - 7) Changing the password
 - 8) Setting the gas sample transport time per sampling point
 - 9) Setting the analysis time
 - 10) Enabling the extended analysis time with the following trigger threshold parameters:
 - a) Rate of signal rise per analyzer or sensor
 - b) Signal level increasing to a preset level
 - c) Signal level decreasing to a preset level
 - 11) Setting the alarming hysteresis per analyzer or sensor

- 12) Parameters for the optional user configured output relays:
 - a) fail safe or non-fail safe relay operation
 - b) On delay relay operation
 - c) Off delay relay operation
 - d) Steady or pulsed outputs
- c. Programming Lock Out - A password shall be necessary for the purpose of preventing unauthorized personnel from altering the systems programmed parameters.
- d. System Memory - All programmed values shall be stored on a Secure Digital (SD) Card that is local to the processor. Battery backup shall be provided to retain current status if power is lost.
- e. Alarm/Control - Four common alarm/control set point levels shall be provided for all sample location. These four will be: Horn, Trouble, Warning and Alarm. These relays will be single pole double throw (SPDT) at least 8 amp @ 250 VAC. The system shall have the capability of providing up to 64 optional user configurable discrete alarm relays or solid state outputs.
 - 1) Optional user configurable discrete alarm relays
 - a) These optional discrete alarm relays shall be single pole double throw (SPDT) at least 10 amp @ 250 VAC.
 - b) These optional discrete alarm relays shall be available in the following configuration:
 - 16 warning and 16 alarm relays
 - 32 warning and 32 alarm relays
 - 2) Optional user configurable solid state outputs
 - a) These optional solid state outputs shall be capable of sinking 100 mA @ 24 VDC.
 - b) These optional solid state outputs shall be available in the following configuration:
 - 1) 16 warning and 16 alarm outputs
 - 2) 32 warning and 32 alarm outputs
- f. Front Panel Display
 - 1) Alarm Indication

- 2) Location Indicator
- 3) Malfunction Indicator - The display shall be indicate any of the following conditions:
 - a) analyzer under range
 - b) analyzer over range
 - c) auto standardization limit exceeded
 - d) flow failure
- 4) Sequence Mode Indication
- 5) Calibration Mode Indication
- g. Automatic Analyzer Correction - The controller must be capable of introducing zero and calibration gases and automatically correcting the gas value reading. Timing and limits setting shall be programmable
- h. Data Storage – Gas concentrations and alarm setting shall be capable of being exported to a flash drive in .CSV format via a removable SD Card.
- i. Digital Output – An optional; Modbus TCP or BACnet IP output shall be available to enable communication to other equipment or controllers.
5. Sample Handling
 - a. Sample Line Compatibility - The system shall be capable of drawing a gas sample through 3/16" ID NPT tubing for a distance of 166.6 meters (500 feet).
 - b. Sample Line Flow Rate - The system shall be capable of drawing a gas sample through 0.175" ID tubing at a rate of at least 20 SCFH (10 LPM) typical, no load. The full load rate shall be: 10 SCFH (5 LPM) typical.
 - c. Gas sampling scheme - The system shall employ a look ahead bypass sampling scheme. The system will not only pump on the current sampling point but also pump on the next sampling point even if the sampling point order is not in numeric order.
 - d. Sample Conditioning - The system shall provide adequate filtration of the sample suitable to protect the analyzer.
 - e. Exhaust - Exhaust fitting shall be provided on the side of the enclosure for the purpose of attaching exhaust lines to the sample and bypass flows.
 - f. Calibration Gas Connection - Inlet fittings shall be provided on the side of the enclosure for the purpose of connecting the calibration gas supplies (zero and span).

- g. Flow Failure Detection - The system shall be capable of detecting a flow failure in any of the sampling lines
 - 6. Analyzer - The analyzer sub-system shall detect dangerous presence of gas per manufacturer recommendations. Gas sensors to be internal to system. Sample tubing to be provided that samples air from potential hazardous spaces and analyzes local at the gas control panel.
 - 7. System Performance
 - a. Analyzer Reproducibility requirement - The analyzer(s) must keep its output signal reproducible within the limits of +2% Full Scale (FS).
 - b. Analyzer Stability requirement - The 24 hour zero or span drift of the analyzer(s) must be less than 2% without the aid of automatic or manual recalibration.
 - c. Environmental Specifications
 - 1) Operating: 32° to 95°F (0° to 35°C)
 - 2) Non-Operating: 14° to 140°F (-10° to 60°C)
 - 3) Gas Sample: 0° to 140°F (-17° to 60°C)
 - 4) 5 to 85% RH non-condensing (humidity)
 - 8. Programming Limits
 - a. Gas Sample Point Dwell Time = 10-300 seconds (in one second increments) per point.
 - b. Alarm Levels = 0-100% of full scale in one percent increments
 - c. Frequency of Automatic Zero = Every 8 hours
 - d. Frequency of Automatic Span = Every 8 hours
 - e. Automatic Adjustment Limits = "5% (before trouble is indicated)
 - 9. System shall operate at 120VAC.
 - 10. Max System Maintenance Requirement - With the exception of resupply of zero and span gas, no routine maintenance shall be required.
 - 11. Gas monitoring panel shall include internal power supplies and relays as required to energize the alarm light and sounder circuits shown on the Contract Drawings.
- B. Combustible Gas Monitors
- 1. Sensor to be ultima XIR or approved equal

2. 316 stainless steel enclosure shall satisfy Class I, Division 1, Groups A, B, C, and D hazardous atmospheres.
- C. Toxics and Oxygen Gas Monitors
1. Toxic gas sensors shall be the electrochemical type. The sensor must not require the periodic addition of reagents.
 2. Oxygen depletion sensors shall be the electrochemical fuel cell type. The sensor must not require the periodic addition of reagents.
 3. Gas measurement shall be temperature compensated.
 4. Shall be a remote diffusion type, resistant to silicone poisoning and hydrogen sulfide poisoning.
 5. 316 stainless steel enclosure shall satisfy Class I, Division 1, Groups A, B, C, and D hazardous atmospheres.
 6. Each sensor shall have its own input output amplifier section.
- D. All Gas Monitors
1. Each transmitter shall produce a directly proportional 4-20 mA output correlating to 0 value at 4 mA and 100 percent full value at 20 mA.
 2. 316 stainless steel enclosure with UL approved NPT conduit entries.
 3. Calibrations shall be performed without opening the transmitter enclosure.
 4. Transmitters to be powered from the gas monitoring control panel. Provide all necessary control panel internal power supplies in order to provide power to sensors/transmitters.
 5. Performance Requirements
 - a. Repeatability - Less than 2 percent full-scale for 0 to 100 percent LEL.
 - b. Operating Temperature - -4 to 122 degrees F.
 - c. Operating Humidity - 0 to 95 percent non-condensing.
 - d. Stability - +3 percent full-scale per year.
 - e. Linearity - Less than +2 percent full-scale.
 - f. Response Time - Less than 30 seconds.

g. Operating Voltage - 24 VDC, 3-wire.

- 1) Transmitters to be powered out of proposed gas monitoring panel. Provide necessary DC power supplies, control transformers, etc. as required to provide an overall complete/operable system.

2.03. WIRING

- A. All circuitry (conduit and conductors) as shown/specified on the Contract Drawings shall be included for an overall complete and operable system. Refer to Riser Diagrams on Contract Drawings for circuitry specifications.

2.04. ACCESSORIES

- A. Nameplates - Provide rigid, laminated name tags with 5/16-inch high white letters on black background. Each monitor shall have nametags for the monitor designation and the designations for each of the sensors it monitors. Each alarm light shall have a nameplate indicating its intent.
- B. Provide calibration kit per manufacturers recommendations.
- C. Provide end of line (EOL) filter kit per manufacturer recommendations.
- D. Provide teflon tubing (1/4" OD and 3/16" ID) as indicated on the contract drawings. Provide all necessary installation hardware and brackets for installation.

2.05. CONTROLS

- A. All equipment specified in this section shall be electrically complete in that the Contractor is required to furnish and install only exterior power and signal wiring, conduits, fittings, etc. Labeled terminal strips shall be utilized throughout.
- B. Contractor shall furnish sufficient length cables as required by the equipment manufacturer. Cables shall be installed in conduit by the Contractor.
- C. Where required, alarm and warning setpoint gas concentrations shall be as follows and configured as such for the respective transmitters:
 1. Combustible Gas - Warning 10.0 percent LEL; alarm 20.0 percent LEL.
 2. Hydrogen Sulfide - Warning 10.0 ppm, alarm 15.0 ppm.
 3. Oxygen Depletion - Warning 19.5 percent, alarm 18.0 percent.
 4. Carbon Monoxide - Warning 10.0 ppm, alarm 15.0 ppm.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Installation shall be in strict accordance with the respective instructions of the manufacturers in the locations shown on the Contract Drawings.

3.02. FIELD SERVICE

- A. Calibrate sensors
- B. Configure warning setpoints
- C. Configure alarm setpoints
- D. Configure the Transmitter to drive the analog output signal to 3.7 mA in the event of failed self-diagnostic tests.
- E. Programming - Include 1 day for a manufacturer authorized service representative to meet on-site with the Owner/Engineer to discuss sequence of operation.
 - 1. i.e., which lights/horns are to illuminate and when, etc.
- F. Final Acceptance - Include 1/2 day for a manufacturer authorized service representative to test equipment to demonstrate that the system operates as specified.
- G. Installation - Include 1 full day for a manufacturer authorized service representative to verify proper mounting of the equipment, including mounting technique, mounting surface, and functional location.
 - 1. Provide MSA model # Z-COM-PREM-4 premium factory on-site commissioning services at each project site.
- H. Training - Provide a two-hour session of instruction to be conducted at project site by the manufacturer. Notify the Engineer and Owner in writing a minimum of two weeks in advance. Duration of training is actual on-site training time with the operators; travel and other time shall be separate from this training requirement.

END OF SECTION

SECTION 33213

WATER SUPPLY WELL

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Remove existing well pump, piping, appurtenances and pitless adapter. Furnish, install, and test a new well pump, piping, pitless adapter and controls. The complete system will include a well pump with motors, variable frequency drive (VFD), pressure transducer and pressure switch and all other required accessories in accordance with the Contract Documents.

1.02. REFERENCES

- A. Hydraulic Institute Standards - Latest Edition
- B. AWWA A100 Standards for Water Wells
- C. ANSI
- D. ASTM A53/A53M – Standard Specifications for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- E. UL
- F. ISO
- G. NEMA
- H. ETL
- I. CSA
- J. NEC
- K. IEC
- L. NSF

1.03. PERFORMANCE REQUIREMENTS

- A. All components of the plant water pumping system, including motor, variable speed drive, pressure transducer, pressure switch and accessories shall be furnished by a single equipment supplier who shall be responsible for the proper functioning of the entire system in compliance with this equipment specification.
- B. The well pump, including motor and VFD controllers, shall be suitable for continuous operation throughout the specified flow conditions without damage or overheating.
- C. The well pump system shall be capable of performing to the following conditions.

Pump Type	Submersible Multi-Stage Groundwater Pump
Pump Capacity	45 gpm minimum
Operating Pressure at Tank	60 to 90 psi
Rated Motor Horsepower	7.5 HP
Enclosure	NEMA 12

1.04. SUBMITTALS

- A. Provide in accordance with Sections 013300, Submittals; 016400, Equipment-General; and as supplemented herein. Submittals shall include, but not be limited to, the following:
 - 1. Shop Drawings - Shop drawing submittal shall include detailed information the well pump, pump controller, including operating characteristics, nameplate data, maximum recommended starts per hour, wiring diagrams showing power and control wiring terminal connections with wiring identification and color coding, junction box sizing for power and control wiring connections, accessories, supports, connections, outlets, and related piping.
 - 2. Certified performance curves for the specified design conditions.
 - 3. Performance affidavits.
 - 4. Shop test results.
 - 5. Manufacturer's Installation Certificate.
 - 6. Certification of equipment compliance.
 - 7. Field test reports.
 - 8. Training plans.
 - 9. Recordings of training.
 - 10. Training reports
 - 11. Manufacturer's equipment warranty – 24 months from date of system startup.
 - 12. Manufacturer's instructions and/or operation and maintenance manual.
 - 13. Training video recordings.
- B. Provide operation and maintenance manuals and data where scheduled in Section 016400, Equipment-General.
- C. Submit certifications for iron and steel products in accordance with AIS requirements and Section 013300, Submittals.

1.05. EQUIPMENT WARRANTIES AND SPECIAL GUARANTEES

- A. The supplier shall provide the following warranties and special guarantees in accordance with Section 016400, Equipment-General.

1. The equipment manufacturer shall guarantee for a period of three years starting at the time of equipment delivery to the job site or one year starting at the time of Substantial Completion (whichever is shorter), that the equipment supplied is free from defects in materials or workmanship and will meet the specified performance requirements when operated in accordance with the manufacturer's recommendations. The manufacturer shall correct any breach in this warranty at their expense.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. The well pump and pump control manufacturer shall be the following or approved equal:
 1. Grundfos.

2.02. EQUIPMENT DESIGN

- A. Well Pump
 1. The pump shall be a multi-stage submersible pump for raw water supply.
 2. Pump Material: Stainless Steel AISI 304
 3. Impeller Material: Stainless Steel AISI 304
 4. Motor Casing: Stainless Steel AISI 304

2.03 ACCESSORIES

- A. A pressure transducer shall be factory installed on the discharge manifold (or field installed as specified on plans). Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be +/- 1.0% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32 VDC.
- B. A bourdon tube pressure gauge, 2.5-inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless-steel case. Gauge accuracy shall be 2-1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
- C. An adjustable pressure switch shall be installed pipe manifold for the hydropneumatics pump. All wetted parts shall be of stainless steel. The pump shut-down pressure shall be 3 psig with a reset pressure of 5 psig. A normally open dry contact shall be provided on the VFD/Motor for field installation.
- D. The system shall include a factory installed service disconnect switch mounted in a lockable NEMA 4 enclosure.

2.03. CONTROLS

- A. The pump system controller (Proportional-Integral) shall be a standard component of the integrated variable frequency drive motor developed and supported by the pump manufacturer.
- B. The pump system controller shall have an easy to use interface mounted on the VFD/motor enclosure. Pump system start/stop and set-point adjustment shall be possible through the use of two push buttons located on the drive enclosure.
- C. The VFD/motor shall be capable of receiving a remote analog set-point (4-20mA or 0-10 VDC) as well as a remote on/off (digital) signal.
- D. Pump status and alarm state shall be indicated via two LED lights located on the VFD/motor enclosure. Programming and troubleshooting shall be possible via an infra-red hand held programmer or a field connected personal computer. Pump system programming (field adjustable) shall include as a minimum the following:
 - 1. System Pressure set-point, psig
 - 2. System start pressure, psi
 - 3. System Stop pressure, psi
 - 4. Minimum Pump Speed,
 - 5. Pressure Transducer supply/range
 - 6. Maximum Pump Speed, %
 - 7. System Time (Proportional Gain)
 - 8. Integral Action Time
- E. Programming/Communications
 - 1. The system controller shall monitor the discharge pressure for the pumping system transmitted from the pressure indicating transmitter.
 - 2. The VFD's shall be capable of transmitting all system operational data, including equipment run status and speed and alarm conditions via hardwired signals to the Chemical Building PLC.

2.04. FABRICATION REQUIREMENTS

- A. Shop coat per manufacturer's standard finish system and color.
- B. All bolts, nuts, washers, and other fasteners shall be Type 304 stainless steel unless otherwise noted.
- C. Welds shall be continuous unless noted otherwise.

- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Furnish nameplates for each equipment.
 - 1. Equipment nameplates of stainless steel shall be engraved or stamped and fastened to the equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins.
 - 2. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the equipment performance ratings.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- B. No modifications to equipment shall be made without the written consent of the manufacturer and approval of Engineer.
- C. Field verify all dimensions and elevations. Notify Engineer of specific differences.
- D. Furnish all necessary materials (including lubricants, chemicals, etc.) and equipment (including measuring devices, etc.) for testing and startup.
- E. Surface preparation and field painting shall be in accordance with Division 9 specifications.
- F. All bolts, nuts, washers, and other fasteners shall be Type 316 stainless steel unless otherwise noted.
- G. Anchor rods (bolts) shall be Type 316 SS HILTI-style adhesive anchors.
- H. Backpaint aluminum in contact with painted or galvanized steel or concrete with 5 mils of Tnemec Series 66-Gray, Hi-Build Epoxoline or DuPont 25P Epoxy.
- I. Isolate dissimilar metals by backpainting or with dielectric using stainless steel fasteners.

3.02. TESTING AND STARTUP

- A. Testing and startup shall be performed in accordance with Sections 016400, Equipment-General; 017500, Starting of Systems; and as specified herein unless otherwise noted.
- B. The well pump system manufacturer shall provide manufacturer's services at the jobsite at no additional cost to the Owner. One full 8-hour day of service from manufacturer's representative shall be provided to approve installation and advise the Contractor during startup, testing, and final adjustment of the system.

3.03. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide services of the equipment manufacturer or their approval representative in accordance with Section 016400, Equipment-General, and as specified herein.

3.04. FAILURE OF EQUIPMENT TO PERFORM

- A. Promptly correct by replacement or otherwise any defects in the equipment, or failure to meet the guarantees or performance requirements.
- B. Upon failure to make these corrections, or if the improved equipment again fails to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for work and materials which have entered into the manufacture of said equipment, may reject said equipment and order it removed from the premises and replaced with new equipment at the manufacturer's expense.

END OF SECTION

SECTION 41220

HOISTS AND CRANES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Furnishing and installing of hoists, and related equipment.
- B. Regulatory codes and requirements.

1.02. SUBMITTALS

- A. Submit in accordance with 013300, Submittal Procedures.
- B. Submit single-page catalog cuts clearly indicating items to be furnished, including maintenance requirements.
- C. The shop drawings shall show hook height, lift range, trolley travel range, hoist and trolley type, end trucks, and rail stops.
 - 1. The Drawings shall be prepared specifically for this project.
 - 2. Marked-up reproductions of general, standard, and/or Contract Drawings will not be accepted.
 - 3. Include catalog cuts all hoists, trolleys, end stops, and other accessories.

1.03. REFERENCES

- A. Specifications for underhung cranes and monorail systems, published by the Monorail Manufacturers Association, Pittsburgh, Pennsylvania.
- B. ANSI B30.11, Monorail Systems and Underhung Cranes, and ANSI B30.16, Safety Standard for Overhead Hoists.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Monorails shall be supplied by Material Handling Technologies, North Syracuse, NY; ACCO Material Solutions, York, PA; or equal.
- B. Monorail hoists shall be as manufactured by Harrington Hoists and Cranes, Yale, or equal.

2.02. EQUIPMENT DESIGN AND FABRICATION

A. Capacity

1. The capacity of each hoist or the crane system shall be permanently marked in a conspicuous manner on the hoist, and monorail track.
2. The hoists shall lift their rated capacities with a smooth and continuous operation without speed changes or vibration throughout the entire lifting height.

B. Materials

1. Trolleys

- a. Trolleys shall be integral to the hoist mechanism for manual hoists.
- b. Trolleys shall have four or more wheels and have sides extending beyond the wheel flanges to provide bumper protection.
- c. Wheels shall have machined treads, surface hardened to Brinell hardness of 400, and set at the proper angle to bear the load evenly.
- d. Wheels shall be provided with lifetime lubricated ball or roller bearings.
- e. Trolleys shall be compatible with the track system provided by the Contractor.
- f. Trolleys shall be abrasive blasted and epoxy painted for corrosion protection.

PART 3 EXECUTION

3.01. PAINTING

- A. Comply with Section 099000, Painting.
- B. All steel components and accessories shall be abrasive blasted and epoxy painted for an exterior/corrosive environment.
- C. After complete installation and preliminary testing, provide touch-up or repainting of all components.

3.02. EQUIPMENT INSTALLATION

- A. Field Measurements and Dimensions - All measurements and dimensions shall be based on verified field conditions. Verification shall include examination of adjoining work.
- B. Erection - The equipment shall be erected by the Contractor in accordance with the instructions of the manufacturer.

1. In addition to the general requirements of Section 016400, Equipment-General, and the foregoing paragraphs; hoist equipment shall be shipped, assembled and constructed as follows:
 - a. All bolts shall be furnished and installed by the Contractor and shall be of ample size and strength for the purpose intended.
 - b. All parts of the equipment shall be amply proportioned for all stresses that may occur during fabrication, erection and intermittent or continuous operation.
 - c. The equipment shall be assembled by the manufacturer insofar as is practical and shipped in units which will minimize erection costs.

3.03. INSTALLATION AND TESTING

- A. Equipment shall be shop assembled and shop tested to the fullest extent possible prior to shipment to the job site.
- B. Installation shall include all necessary oil and grease for initial operation.
- C. Prior to turning the installation over to the Owner, the entire installation shall be tested for the following conditions:
 1. No-load operation in all moving stages for a period of 30 minutes.
 2. Operate and load test at 125 percent of field rated load capacity for at least 20 minutes, demonstrating starting hoisting, lowering, travel speed and lifting speeds.
 3. Suspend the rated load from the hook, held solely by the hoist brake, for a period of 10 minutes without change of position.
 4. The equipment shall demonstrate compliance with pertinent codes and specifications, that it has been properly erected and adjusted, and that it is ready for service.
 5. Should any defects develop during the tests, they shall be corrected at the Contractor's expense.
- D. Tests, trials and initial operation shall be performed as set forth in Section 016400, Equipment- General.

3.04. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Manufacturer's representative services shall be provided in accordance with Section 016400, Equipment-General, and as specified herein.
 1. To assist with initial installation and startup, the equipment manufacturer shall be on site to provide assistance to the Contractor.
 2. After initial startup and during the first year of operation, a representative of the manufacturer shall make one visit to the plant for not less than four hours.

3. The purpose of this visit shall be to review equipment operation, assist the operators and inspect the equipment installation.
4. During the first year of operation, should the system or any of its components fail to operate satisfactorily for any reason other than proven Owner negligence, the Contractor shall make such repairs, replacements, or other modifications as required to render the system satisfactory.

(continued)

3.05. EQUIPMENT SCHEDULE

A. All equipment furnished under this section shall be in accordance with the equipment schedule below.

1. Manually Operated Hoists and Trolley

Location	Capacity (Tons)	Track Elevation Above Floor (Feet)	Hook Height Above Floor (Feet)	Lift (Feet)	Drawing No.	Remarks
Lower Level - Pump Room	2	NA	8 ft	10 ft		Hoist only
Intermediate Level – Dry Well	2	NA	8 ft	20 ft		Hoist Only
Upper Level – Electrical Room	2	10 ft	8 ft	20 ft		Hoist and Trolley

END OF SECTION

APPENDIX 1

Hazardous Materials Survey

ENVIRONMENTAL MAINTENANCE CONTRACTORS, INC.

Environmental Consulting, Testing, Reporting and Remedial / Abatement Services

May 11, 2022

Ray Schofield
Senior Project Manager - Engineering Division
Environmental Design & Research
217 Montgomery Street, Suite 1000
Syracuse, New York 13202

Phone: (315) 471-0688
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LIMITED ASBESTOS INSPECTION REPORT FOR THE WESTCHESTER COUNTY PUMP STATIONS

SUBJECT PROPERTIES

The subject properties include the three (3) pump stations in Westchester County, NY as listed below:

- Jackson Avenue Pump Station in Hastings-on-Hudson
- Saxon Woods Pump Station in New Rochelle
- Fifth Avenue Pump Station in New Rochelle

TARGET AREAS

The Target Areas include the interior and exterior of the subject properties.

INSPECTION RATIONALE

Environmental Maintenance Contractors, Inc. (EMC) was retained to perform a non-destructive limited inspection of the Target Areas including sample collection of readily accessible suspect Asbestos Containing Materials (ACM). No penetrations or exploratory demolition was performed to collect any suspect ACM samples during the asbestos survey, including but not necessarily limited to areas above, behind or under ceilings, walls and floor cavities.

INSPECTION AND BULK SAMPLE COLLECTION

The Target Areas were inspected for suspect ACM on April 19, 2022.

All accessible areas/rooms within the Target Areas were visually inspected and representative sampling collected, as appropriate. The inspection was performed by Jose Tunas and Kristofer Yee, representing EMC. Mr. Tunas (Cert. # 19-04129) and Kristofer Yee are NYSDOL Certified Asbestos Inspectors.

INSPECTION PROTOCOL

The purpose of the inspection was to identify readily accessible ACM within the Target Areas. To perform this inspection, EMC's inspectors visited all accessible areas within the Target Areas and collected samples of representative suspect ACM.

INACCESSIBLE AREAS

Access to Roof Chimney was not available at Jackson Ave Pump Station and Fifth Avenue Pump Station. There were no inaccessible areas at Saxon Woods Pump Station.

LABORATORY

Following collection of bulk samples, the samples were submitted to ATC Group Services LLC (ATC) located at 104 East 25th Street, New York, NY 10010. ATC is a laboratory accredited by the New York State Department of Health (NYS DOH) Environmental Laboratory Approval Program (ELAP), National Voluntary Laboratory Accreditation Program (NVLAP) and by the AIHA Laboratory Accreditation Programs, LLC for analysis for total asbestos content.

Friable materials (ceiling material core & paper, joint compound, brick and mortar) and Non-Friable-Organically Bound (NOB) materials (Caulking, Roofing Materials, etc.) were both analyzed by Polarized Light Microscopy (PLM).

Any NOB sample found to be negative for asbestos via PLM analysis were analyzed via Transmission Electron Microscopy (TEM) for confirmatory purposes, as per NYS requirements. The NYS DOH requires TEM analysis to conclusively state that a NOB sample is not ACM.

SAMPLED MATERIALS

The following is a listing of the suspect ACM collected from the target area and submitted for analysis for the purpose of this report:

JACKSON AVENUE PUMP STATION:

- Tar Paper
- Roof Shingles
- Exterior Brick & Mortar
- Ceiling Material (Core & Paper)
- Joint Compound
- Black Waterproofing
- Exterior Vent Caulking
- Door Caulking

SAXON WOODS PUMP STATION:

- No Suspect ACM

FIFTH AVENUE PUMP STATION:

- Tar Paper
- Roof Shingle
- Exterior Brick & Brick Mortar
- Brick/Floor Caulking
- Waterproofing (Black)
- Exterior Vent Caulking (White & Grey)
- Pipe Patch
- Window Glazing

RESULTS AND QUANTITIES (ACM ONLY)

Sample analysis indicates that the following materials were found to contain asbestos in concentrations greater than one percent (>1%) and are therefore deemed ACM, including:

JACKSON AVENUE PUMP STATION

ACM Type	Location	Approximate Quantity
Black Waterproofing	Sub-Floor 1 South Wall of Jackson Ave Pump Station	4 Square Feet
Roof Shingles (Top Layer)	Roof of Jackson Ave Pump Station	600 Square Feet
Flashing and Tar Around Chimney (Assumed ACM)	Roof - Chimney	9 Square Feet

FIFTH AVENUE PUMP STATION

ACM Type	Location	Approximate Quantity
Black Waterproofing	Southeast Corner of Fifth Ave Pump Station	2 Square Feet
Window Glazing	Bathroom Windows of Fifth Ave Pump Station	8 Square Feet
Chimney Flashing and Associated Tar (Tar, Tar Paper, etc.)	Roof - Chimney	9 Square Feet

Note: All quantities are an “Estimate/Approximate and/or to be determined (TBD)” at this time. Field verification is necessary to confirm site conditions, locations and quantities of ACM identified.

CONCLUSIONS

The limited asbestos inspection **did** identify readily accessible ACM within the Target Areas of the Jackson Ave Pump Station and Fifth Ave Pump Station. Please find attached the laboratory data report for samples that were collected.

Based on the nature of this inspection, it is possible that unidentified materials may be uncovered and/or encountered during the demolition activities. If additional suspect ACM are encountered during demolition, work should cease within that area of work, the area should be isolated from unauthorized entry, and the materials should be sampled for analysis to determine total asbestos content. Only through further sampling by properly certified personnel and analyzed in an accredited laboratory can a suspect material be identified as non-ACM. Additionally, if any identified ACM are encountered, they should be treated as ACM.

As per applicable Federal, State, and City regulations all ACM identified that would be disturbed as part of the project must be properly abated by a NYS DOL Licensed Asbestos Contractor utilizing NYSDOL Certified personnel prior to any repair/renovation activities. Any penetrations to the ACM or impact to the intact ACM matrix would be considered a disturbance. Please note that any non-asbestos contractor performing any work that may impact the building materials must be informed of the presence and location of the ACM, and that disturbance is prohibited. In addition, the non-asbestos contractor personnel performing any work on or around ACM must have current OSHA Asbestos Awareness Training.

Should you have any questions or require additional information, please do not hesitate to contact me at (914) 232-7355.

Sincerely,

Environmental Maintenance Contractors, Inc.

Allan Ciriaco

Vice President of Operations

Attachment(s): Laboratory Sample Results, Licenses and Certifications



ATC Group Services LLC

104 E. 25th Street, 8th Floor

New York, NY 10010

Tel. 212-353-8280

Fax: 212-353-8306

AMENDED

Client: ENVIRONMENTAL MAINTENANCE CONTRACTORS

333 LEXINGTON AVENUE

MT. KISCO, NY 10549

Fax: (914) 232-7357

Phone: (914) 232-7355

Sample Date: 4/19/2022

Date Received : 4/21/2022

Date Analyzed : 4/25/2022

Project: EDR

ATC Batch # 54287 A

Methods: ELAP 198.1, 198.6, 198.4

Location: JACKSON PUMP STATION / JACKSON AVE., YONKERS, NY

Bulk Asbestos Analysis Results

Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u>	<u>Asbestos</u>
				% Fibrous	% Non-Fibrous	% Type	% Type
1	ROOF - ENTIRE	TAR PAPER	NOB-TEM			95.5% Organic 1.7% Residue 2.8% Carbonate	NONE DETECTED
54287 A -1					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
2	ROOF - ENTIRE	TAR PAPER	NOB-TEM			96.4% Organic 1.2% Residue 2.4% Carbonate	NONE DETECTED
54287 A -2					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
3	ROOF - ENTIRE	ROOF SHINGLES (BOTTOM)	NOB-TEM			20.9% Organic 68.8% Residue 10.3% Carbonate	NONE DETECTED
54287 A -3					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
4	ROOF - ENTIRE	ROOF SHINGLES (BOTTOM)	NOB-TEM			22.8% Organic 66.1% Residue 11.1% Carbonate	NONE DETECTED
54287 A -4					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
5	ROOF - ENTIRE	ROOF SHINGLES (TOP)	NOB-PLM			49.7% Organic 37.1% Residue 8.2% Carbonate	5% Chrysotile
54287 A -5					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BLACK	Total Asbestos: 5.0 %				
6	ROOF - ENTIRE	ROOF SHINGLES (TOP)	NOB-PLM			46.2% Organic 45.3% Residue 3.5% Carbonate	5% Chrysotile
54287 A -6					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BLACK	Total Asbestos: 5.0 %				
7	EXTERIOR - ENTIRE	BRICK	PLM		100% Mineral Filler		
54287 A -7					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: RED					



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Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u> % Type	<u>Asbestos</u> % Type
				% Fibrous	% Non-Fibrous		
8	EXTERIOR - ENTIRE	BRICK MORTAR	PLM		100% Mineral Filler		
54287 A -8					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GRAY					
9	EXTERIOR - ENTIRE	BRICK	PLM		100% Mineral Filler		
54287 A -9					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: RED					
10	EXTERIOR - ENTIRE	BRICK MORTAR	PLM		100% Mineral Filler		
54287 A -10					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY					
11	EXTERIOR - WEST SIDE ON WALL	EXTERIOR VENT CAULKING	NOB-TEM			55% Organic 25% Residue 20% Carbonate	
54287 A -11					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: WHITE	Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive			
12	EXTERIOR - WEST SIDE ON WALL	EXTERIOR VENT CAULKING	NOB-TEM			48.5% Organic 33.6% Residue 17.9% Carbonate	
54287 A -12					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: WHITE	Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive			
13	MAN LEVEL - ENTIRE	CEILING MATERIAL CORE	PLM	2% Cellulose 2% FiberGlass	96% Mineral Filler		
54287 A -13					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY					
14	MAN LEVEL - ENTIRE	CEILING MATERIAL PAPER	PLM	95% Cellulose	5% Mineral Filler		
54287 A -14					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: BROWN					
15	MAN LEVEL - ENTIRE	CEILING MATERIAL CORE	PLM	2% Cellulose 2% FiberGlass	96% Mineral Filler		
54287 A -15					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY					
16	MAN LEVEL - ENTIRE	CEILING MATERIAL PAPER	PLM	95% Cellulose	5% Mineral Filler		
54287 A -16					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: BROWN					
17	MAN LEVEL - ENTIRE	JOINT COMPOUND	PLM	Trace% Cellulose	100% Mineral Filler		
54287 A -17					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: WHITE					



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Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u>	<u>Asbestos</u>
				% Fibrous	% Non-Fibrous	% Type	% Type
18	MAN LEVEL - ENTIRE	JOINT COMPOUND	PLM	Trace% Cellulose	100% Mineral Filler		
54287 A -18					0.0% Vermiculite		NONE DETECTED
Color: WHITE							
Analyzed By: Ivan Reyes							
19	SUB FLOOR 1 - SOUTH SIDE ON WALL	BLACK WATERPROOFING	NOB-PLM			63.2% Organic 9.8% Residue 23.8% Carbonate	3.2% Chrysotile
54287 A -19					0.0% Vermiculite		
Color: BLACK							
Analyzed By: Ivan Reyes				Total Asbestos: 3.2 %			
20	SUB FLOOR 1 - SOUTH SIDE ON WALL	BLACK WATERPROOFING	NOB-PLM			61.4% Organic 9.5% Residue 25.2% Carbonate	3.9% Chrysotile
54287 A -20					0.0% Vermiculite		
Color: BLACK							
Analyzed By: Ivan Reyes				Total Asbestos: 3.9 %			
21	MAN LEVEL - INTERIOR DOORS	DOOR CAULKING	NOB-TEM			46.6% Organic 41.4% Residue 12% Carbonate	NONE DETECTED
54287 A -21					0.0% Vermiculite		
Color: OFF WHITE							
Analyzed By: Ivan Reyes		Second Analyst: Feyza Gungor		Comments: NOB PLM Inconclusive			
22	MAN LEVEL - INTERIOR DOORS	DOOR CAULKING	NOB-TEM			43.1% Organic 47.8% Residue 9.1% Carbonate	NONE DETECTED
54287 A -22					0.0% Vermiculite		
Color: OFF WHITE							
Analyzed By: Ivan Reyes		Second Analyst: Feyza Gungor		Comments: NOB PLM Inconclusive			



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Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u>	<u>Asbestos</u>
				% Fibrous	% Non-Fibrous	% Type	% Type

NOTES:

- 1) The Limit of Detection is the same as the Reporting Limit for these results.
- 2) The Reporting Limit (RL) is the Limit of Quantitation. For point counts the limit of quantitation of 0.25%; based on one asbestos point counter over 400 non-empty points.
- 3) Asbestos Containing Material (ACM) Definition: > 1% asbestos by weight is considered an ACM
- 4) Disclaimer: The laboratory is not responsible for sample collection. Please refer to enclosed letter. This report may not be reproduced, except in full, without written approval by ATC Group Services. This report may not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government. This report relates only to the samples reported above as described in the chain of custody. Quality control data is available upon request.
- 5) Accredited by NVLAP #101187-0 and by NY State ELAP #10879
- 6) Confidentiality Notice: The document(s) contained herein are confidential and privileged information, intended for the exclusive use of the individual or entity named above.
- 7) Liability Notice: ATC Group Services and its personnel shall not be liable for any misinformation provided to us by the client regarding these samples. This report relates only to samples submitted and analyzed.
- 8) Asbestos results are reliable to 2 significant figures.
- 9) The condition of all samples was acceptable upon receipt.
- 10) The laboratory certifies that the test results meet all requirements of NELAC.
- 11) Supplement to test report batch # 54287. Amendments: A. Amendment Dates: 5/5/22. Amended by: GC
- 12) PLM Letter is attached on this report.
- 13) TRACE: The result is reported as Trace when No points are counted and asbestos is identified. For ELAP Trace is < 1%.
- 14) ATC Group Services certifies that this report is an accurate and authentic report of the results obtained from the laboratory analysis
- 15) The uncertainty for these test results is available upon request.
- 16) ELAP requires method ELAP 198.1 for the analysis of samples containing ≤ 10% vermiculite. For samples containing > 10% vermiculite ELAP requires methods ELAP 198.1 followed by ELAP 198.6. "This method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite."

Ivan Reyes

Analyst:

Feyza Gungor

Analyst:

Mei Wang

Approved by
Quality Manager:

Page: 54287 of ✓

Asbestos Bulk Sample Analysis - Chain of Custody

Client: <u>EDR</u>	DATA DELIVERY	Turn Around Time
Site Location: <u>Jackson Ave. York, NY</u>	Phone: (914) 232-7355	Rush 12hr 24hr 48hr 72hr
Project: <u>Jackson Pump Sta</u>	Fax: (914) 232-7357	Other: _____
Inspection Start/End Time: _____	Email: <u>admin@enviromain.com</u>	Lab#: _____
Technician: <u>J. Lewis</u>	Cert#(s): <u>16-04116</u>	Exp: <u>6/12</u>

Field #	Group	Sample Description	Location	Enable VIN	Asbestos Content	Notes
1		Tar Paper	Roof - Entire	N		
2		" "				
3		Roof Insulation (Bottom)				
4		" "				
5		" " (Top)				
6		" "	Roof - Entire	N		QC BY
7		Brick	Gutter - Entire	Y		
8		" "				
9		" "				
10		" "	Gutter - Entire	Y		
11		Gutter - Vent Casing	1 - West Side Cn Vent	N		Analyzed by: Tumbay 4/22/2022
12		" "	Gutter - " Side "	N		1:13 pm
13		Ceiling Material Core	Main Level - Entire	Y		Analyzed by: Tumbay 4/25/2022
14		" "				1:10 pm
15		" "	Main Level - Entire	N		TEM: Pepperginger Feq 4/25/22 @ 14:01
16		" "				

Sampled By: (Signature)	Date
1) _____	_____
Printed Name:	Time
_____	_____
Relinquished By: (Signature)	Date
2) _____	_____
Printed Name:	Time
_____	_____



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Client: ENVIRONMENTAL MAINTENANCE CONTRACTORS

333 LEXINGTON AVENUE

MT. KISCO, NY 10549

Fax: (914) 232-7357

Phone: (914) 232-7355

Sample Date: 4/19/2022

Date Received : 4/21/2022

Date Analyzed : 4/25/2022

Project: EDR

ATC Batch # 54285 A

Methods: ELAP 198.1, 198.6, 198.4

Location: FLOWERS PARK / FIFTH AVE. PUMP STATION

Bulk Asbestos Analysis Results

Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u>	<u>Asbestos</u>
				% Fibrous	% Non-Fibrous	% Type	% Type
1	ROOF - ENTIRE	TAR PAPER	NOB-TEM			97.9% Organic 1% Residue	
54285 A -1					0.0% Vermiculite	1.1% Carbonate	NONE DETECTED
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
2	ROOF - ENTIRE	TAR PAPER	NOB-TEM			96.3% Organic 2.2% Residue	
54285 A -2					0.0% Vermiculite	1.5% Carbonate	NONE DETECTED
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
3	ROOF - ENTIRE	ROOF SHINGLE (BOTTOM)	NOB-TEM			19.2% Organic 47.2% Residue	
54285 A -3					0.0% Vermiculite	33.6% Carbonate	NONE DETECTED
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
4	ROOF - ENTIRE	ROOF SHINGLE (BOTTOM)	NOB-TEM			16.4% Organic 50.5% Residue	
54285 A -4					0.0% Vermiculite	33.1% Carbonate	NONE DETECTED
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
5	ROOF - ENTIRE	ROOF SHINGLE (TOP)	NOB-TEM			21.3% Organic 30.4% Residue	
54285 A -5					0.0% Vermiculite	48.3% Carbonate	NONE DETECTED
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
6	ROOF - ENTIRE	ROOF SHINGLE (TOP)	NOB-TEM			22.8% Organic 27.4% Residue	
54285 A -6					0.0% Vermiculite	49.8% Carbonate	NONE DETECTED
Analyzed By: Ivan Reyes		Color: BLACK Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
7	EXTERIOR - ENTIRE	BRICK	PLM		100% Mineral Filler		
54285 A -7					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: RED					



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AMENDED

Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u> % Type	<u>Asbestos</u> % Type
				% Fibrous	% Non-Fibrous		
8	EXTERIOR - ENTIRE	BRICK MORTAR	PLM		100% Mineral Filler		
54285 A -8					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY					
9	EXTERIOR - ENTIRE	BRICK	PLM		100% Mineral Filler		
54285 A -9					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: RED					
10	EXTERIOR - ENTIRE	BRICK MORTAR	PLM		100% Mineral Filler		
54285 A -10					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY					
11	EXTERIOR - ENTIRE	BRICK/FLOOR CAULKING	NOB-TEM			40.6% Organic 1.4% Residue 58% Carbonate	
54285 A -11					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY	Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive			
12	EXTERIOR - ENTIRE	BRICK/FLOOR CAULKING	NOB-TEM			40.5% Organic 3% Residue 56.5% Carbonate	
54285 A -12					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY	Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive			
13	EXTERIOR - SOUTHEAST CORNER	BLACK WATERPROOFING	NOB-PLM			90.2% Organic 7.4% Residue 0.8% Carbonate	1.6% Chrysotile
54285 A -13					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BLACK					
						Total Asbestos: 1.6 %	
14	EXTERIOR - SOUTHEAST CORNER	BLACK WATERPROOFING	NOB-PREP			89.6% Organic 6.2% Residue 4.2% Carbonate	
54285 A -14							NOT ANALYZED
Analyzed By: Ivan Reyes		Color: BLACK		Comments: Not analyzed by NOB PLM, positive stop, see #13			
15	EXTERIOR - VENT (WEST SIDE)	VENT CAULKING - WHITE	NOB-TEM			41.9% Organic 43.2% Residue 14.9% Carbonate	
54285 A -15					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: WHITE	Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive			
16	EXTERIOR - VENT (WEST SIDE)	VENT CAULKING - WHITE	NOB-TEM			39.2% Organic 48.7% Residue 12.1% Carbonate	
54285 A -16					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: WHITE	Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive			
17	WET WELL	GREY VENT CAULKING	NOB-TEM			54.1% Organic 37% Residue 8.9% Carbonate	
54285 A -17					0.0% Vermiculite		NONE DETECTED
Analyzed By: Ivan Reyes		Color: GREY	Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive			



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AMENDED

Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u>	<u>Asbestos</u>
				% Fibrous	% Non-Fibrous	% Type	% Type
18	WET WELL	GREY VENT CAULKING	NOB-TEM			57.5% Organic 33.6% Residue 8.9% Carbonate	NONE DETECTED
54285 A -18					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: GREY Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
19	CELLAR	PIPE PATCH	NOB-TEM			15.6% Organic 32.9% Residue 51.5% Carbonate	NONE DETECTED
54285 A -19					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: WHITE Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
20	CELLAR	PIPE PATCH	NOB-TEM			21.3% Organic 16.5% Residue 62.2% Carbonate	NONE DETECTED
54285 A -20					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: WHITEE Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
21	MAN LEVEL - BATHROOM	WINDOW GLAZING	NOB-TEM			23.7% Organic 12.8% Residue 62.1% Carbonate	1.4% Anthophyllite
54285 A -21					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BEIGE Second Analyst: Feyza Gungor	Comments: NOB PLM Inconclusive				
Total Asbestos: 1.4 %							
22	MAN LEVEL - BATHROOM	WINDOW GLAZING	NOB-PLM			23.3% Organic 17.9% Residue 58.8% Carbonate	NONE DETECTED
54285 A -22					0.0% Vermiculite		
Analyzed By: Ivan Reyes		Color: BEIGE	Comments: NOB-PLM inconclusive, positive stop, see #21				



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Sample #	Location	Type of Material	Method	<u>Non-Asbestos</u>		<u>NOB</u>	<u>Asbestos</u>
				% Fibrous	% Non-Fibrous	% Type	% Type

NOTES:

- 1) The Limit of Detection is the same as the Reporting Limit for these results.
- 2) The Reporting Limit (RL) is the Limit of Quantitation. For point counts the limit of quantitation of 0.25%; based on one asbestos point counter over 400 non-empty points.
- 3) Asbestos Containing Material (ACM) Definition: > 1% asbestos by weight is considered an ACM
- 4) Disclaimer: The laboratory is not responsible for sample collection. Please refer to enclosed letter. This report may not be reproduced, except in full, without written approval by ATC Group Services. This report may not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government. This report relates only to the samples reported above as described in the chain of custody. Quality control data is available upon request.
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- 6) Confidentiality Notice: The document(s) contained herein are confidential and privileged information, intended for the exclusive use of the individual or entity named above.
- 7) Liability Notice: ATC Group Services and its personnel shall not be liable for any misinformation provided to us by the client regarding these samples. This report relates only to samples submitted and analyzed.
- 8) Asbestos results are reliable to 2 significant figures.
- 9) The condition of all samples was acceptable upon receipt.
- 10) The laboratory certifies that the test results meet all requirements of NELAC.
- 11) Supplement to test report batch # 54285. Amendments: A. Amendment Dates: 5/11/22. Amended by: GC
- 12) PLM Letter is attached on this report.
- 13) TRACE: The result is reported as Trace when No points are counted and asbestos is identified. For ELAP Trace is < 1%.
- 14) ATC Group Services certifies that this report is an accurate and authentic report of the results obtained from the laboratory analysis
- 15) The uncertainty for these test results is available upon request.
- 16) ELAP requires method ELAP 198.1 for the analysis of samples containing ≤ 10% vermiculite. For samples containing > 10% vermiculite ELAP requires methods ELAP 198.1 followed by ELAP 198.6. "This method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite."

Amended Report on Location (Per Client Request)

Ivan Reyes

Analyst:

Feyza Gungor

Analyst:

Mei Wang

Approved by
Quality Manager:

Environmental Maintenance Contractors, Inc.

Page: 54285 of 54285

Asbestos Bulk Sample Analysis - Chain of Custody

Client: <u>EDR</u> Site Location: <u>Fluor Dan</u> Project: <u>Fifth Ave Prop Bldg</u> Technician: <u>J. L. W.</u>		DATA DELIVERY Phone: (914) 232-7355 Fax: (914) 232-7357 Email: admin@enviro-main.com		Turn Around Time Rush 12hr <u>24hr</u> 48hr 72hr Other: _____ Lab#: _____	
Date Sampled: <u>7/19/22</u> Inspection Start/End Time: _____ Cert#(s): <u>604163</u> Exp: <u>07/22</u>					

Field #	Group	Sample Description	Location	Friable Y/N	Asbestos Content	Notes
1	1	Tar Paper	Roof - Entire	N		Stop at foot
2	1	" "				porch of
3	1	Roof Shingle (Bottom)				each gap
4	1	" "				
5	1	" " (Top)				
6	1	" " "	Roof - Entire	N		QCEBY
7	2	Brick	Exterior - Entire	Y		
8	1	" " Mortar				
9	1	" "				
10	2	" " Mortar	Exterior - Entire	Y		
11	3	Door/Floor Calking	" "	N		Analytically: Transcribed
12	3	" "	" "			Sampled 4/22/2022
13	7	Black Waterproofing	" - Southwest Corner			12:02pm
14	7	" "	" - " "			Blum NRS: Transcribed
15	5	West Calking - White	" - West (West Side)			Sampled 4/25/2022
16	5	" " - White	" - " "	N		1:42pm

Sampled By: (Signature) 1) _____ Printed Name: _____		Relinquished By: (Signature) 3) _____ Printed Name: _____	
Relinquished By: (Signature) 2) _____ Printed Name: _____		Relinquished By: (Signature) 4) <u>S. Cronin</u> Printed Name: <u>S. Cronin</u> For Laboratory Use	
Date _____		Date <u>7/21/22</u>	
Time _____		Time <u>9:30am</u>	

TEM: Ferragamo
Ferragamo 4/25/22
 C17-35

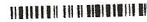
STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



JOSE M TUNAS
CLASS(EXPIRES)
C ATEC(06/22) D INSP(06/22)
H PM (06/22)

CERT# 19-04129
DMV# 651653107

MUST BE CARRIED ON ASBESTOS PROJECTS



IF FOUND RETURN TO:
NYS DOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

EYES BRO
HAIR BRO
HGT 6' 02"

01213 00596942 09



New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

Expires May 31, 2023

ASBESTOS HANDLING LICENSE

Environmental Maintenance Contractors, Inc.

333 Lexington Avenue

Mount Kisco, NY 10549

FILE NUMBER: 05-0348

LICENSE NUMBER: 28535

LICENSE CLASS: FULL

DATE OF ISSUE: 04/26/2022

EXPIRATION DATE: 05/31/2023

Duly Authorized Representative – Richard Stumbo:

This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Amy Phillips, Director
For the Commissioner of Labor

ENVIRONMENTAL MAINTENANCE CONTRACTORS, INC.

Environmental Consulting, Testing, Reporting and Remedial / Abatement Services

May 11, 2022

Ray Schofield
Senior Project Manager - Engineering Division
Environmental Design & Research
217 Montgomery Street, Suite 1000
Syracuse, New York 13202

Phone: (315) 471-0688
Email: rschofield@edrdpc.com

LIMITED LEAD-CONTAINING PAINT INSPECTION & TESTING REPORT FOR THE WESTCHESTER COUNTY PUMP STATIONS

Environmental Maintenance Contractors, Inc. (EMC) has completed the Limited Lead-Containing Paint (LCP) Inspection and Testing services required for the project. The Limited LCP Inspection and Testing of readily accessible painted surfaces was performed within the Interior and Exterior (Target Areas) of the three (3) pump stations in Westchester County, NY as listed below:

- Jackson Avenue Pump Station in Hastings-on-Hudson
- Saxon Woods Pump Station in New Rochelle
- Fifth Avenue Pump Station in New Rochelle

The Limited LCP Inspection and Testing was performed on April 19, 2022.

CREDENTIALS

EMC's New York State Department of Labor, Division of Radiological Safety and Health Operators License is # 3179-4412. EMC's Inspectors/Assessors/XRF Analyzer Operators have been trained in the proper use and handling of this instrument. Each operator has completed the XRF Analyzer Users Training Course and uses the instrument in accordance with all manufacturers' directives and methods.

XRF ANALYZER INSTRUMENTATION CREDENTIALS

Reference checks of the XRF Analyzer against a test validation block (pre- and post-) at the time of testing indicated proper functioning of the instrument.

Calibration of the XRF Analyzer is performed by Thermo Fisher Scientific at time of a source change or repair. Swab tests to determine leakage are performed biannually and at a time of source change or repair and recent testing has determined that leakage of radiation from the instrument was either non detected or below detectable levels, and therefore safe for usage in areas occupied by human life.

LEAD PAINT TESTING METHODS AND REPORTING

EMC performed the Limited LCP Inspection and Testing of readily accessible painted surfaces within the Target Areas of the Jackson Ave Pump Station, Saxon Woods Pump Station, and Fifth Ave Pump Station utilizing a portable XRF Analyzer to directly read milligrams (one thousandth of a gram) of Lead (or “Pb” as the chemical symbol) per square centimeter (mg/cm²) of the tested surface area.

The OSHA Lead Standard for Construction (29 CFR 1926.62) applies to construction work where an employee may be occupationally exposed to Lead (Pb). All work related to construction, alteration, or repair (including painting and decorating) is included. The lead in-construction standard applies to any detectable concentration of Lead (Pb) in paint.

The XRF Analyzer eliminates the inconclusive range by analyzing a surface until either a positive or negative result is achieved at a 95% confidence limit.

INTERPRETATIONS OF XRF DATA

Pb testing or XRF Analyzer readings are provided on the attached XRF Analyzer Data Sheets. As expectable for this analytical methodology, XRF Analyzer values can vary slightly for Pb detected in the same painted surface.

SCOPE OF SERVICES AND XRF TESTING METHODOLOGY

EMC was retained to perform a non-destructive Limited LCP Inspection and Testing of readily accessible painted surfaces within the Target Areas of the Westchester County Pump Stations including Jackson Ave Pump Station, Saxon Woods Pump Station, and Fifth Ave Pump Station. No penetrations or exploratory demolition was performed during the Lead Paint Inspection and Testing to test painted surfaces including but not necessarily limited to concealed building surfaces or separate layers of painted surfaces i.e. sheetrock over wall plaster or concrete, etc.

Following client's/site representative's directives, EMC tested painted surfaces for the purpose of determining the presence of LCP.

Representative surfaces were tested accordingly with the XRF Analyzer in K & L shell mode. If the results from either the K or L shell reading for Pb were less than 1.0 mg/cm², the surface was recorded as not having concentration Lead (Pb). The result of this measurement can be considered accurate to the stated +/- range as determined by the length of sampling until a confidence level of 95% is achieved.

If the results from either the K or L shell reading for Pb were equal to or greater than 1.0 mg/cm^2 , the surface was recorded as having Lead (Pb) or LCP. The result of this measurement can be considered accurate to the stated +/- range as determined by the length of sampling until a confidence level of 95% is achieved.

The XRF Analyzer analyzes a surface for Pb until a positive or negative result is achieved with a 95% confidence limit.

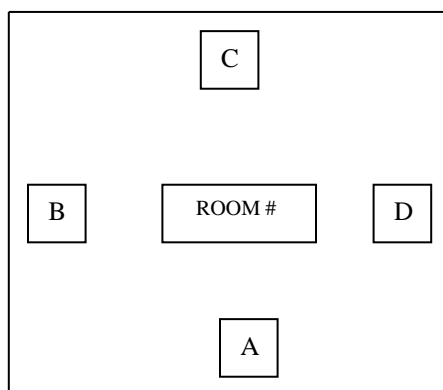
In addition to K & L shell readings the downloaded data reports a “Combined” reading column. This reading represents a “best fit” of either the K or L shell reading, thereby presenting to the inspector the most reliable testing data.

Results based upon the on-site measurements were then recorded by the instrument and downloaded to a desktop computer with all the pertinent information encoded into the instrument.

XRF ANALYZER DATA SHEET SPECIFICS

The XRF Analyzer Data Sheet accompanying this report list the components, substrates, areas/sides of the area(s)/rooms(s) inspected (see drawings for details), conditions, colors and the XRF data results. In addition, the XRF Analyzer Data Sheet lists which side a structure and/or feature was tested on as either A, B, C, or D. These letters refer to wall directions instead of north, south, east, or west. Wall “A” is the wall containing the entry doorway into the specific room with the following letters assigned to walls going clockwise around the room (see diagram below).

WALL DIRECTION DIAGRAM



FINDINGS

The results of the Limited LCP Inspection and Testing via XRF Analyzer indicates that the following painted surfaces were found to contain detectable concentration of Lead (Pb) in paint and are therefore deemed LCP, including:

Saxon Woods Pump Station:

- Manhole Exterior

Fifth Avenue Pump Station:

- Pump Pipe Wall Cap

See data XRF Analyzer Data Sheet for exact details of surfaces and results.

INACCESSIBLE AREAS

The Target Areas were accessible during the time of the Limited LCP Inspection and Testing Services.

DISCLAIMER

This report is for your exclusive use and is only to be used as a guide in determining the presence and condition of the LCP at the building premises during the time of inspection and testing.

This report is based solely upon a visual inspection of the premises, during the time Limited LCP Inspection and Testing, and does not make any determinations with respect to portions of the premises which were not tested or inspected.

EMC, Inc. makes no representation of warranty with respect to your compliance with Local, State, or Federal Statutes, Regulations, or Rules.

However, EMC, Inc. assumes no responsibility for the accuracy and adequacy of said excerpted material or future modifications of it.

Any and all liability on the part of EMC, Inc. shall be limited solely to the cost of this testing report. EMC, Inc. shall have no liability for any other damages, whether consequential, compensatory, punitive, or special, arising out of, incidental to, or as a result of this testing and/or report. EMC, Inc. assumes no liability for the use of this testing and/or report by any other person or entity than the customer for whom it has been prepared.

CONCLUSIONS AND RECOMMENDATIONS

The Limited LCP Inspection and Testing **did** identify accessible LCP within the Target Areas of the Westchester County Pump Stations including Saxon Woods Pump Station and Fifth Avenue Pump Station. Please find attached the XRF Analyzer Data Sheet and drawings for your review.

Please note that Lead (Pb) is present in the paint and OSHA regulations apply to this project. OSHA considers paint containing any level of Lead (Pb) above the analytical method's Limit of Detection (LOD) a potential hazard which should be communicated to any employees or contractors who may disturb the materials in the course of their assigned work. All work that would disturb the LCP should be performed by an EPA certified contractor utilizing appropriately certified and/or trained Supervision and Labor in accordance with all applicable Federal, State and Local regulations (i.e. EPA Lead Safe Work Practices, OSHA Lead Standard for Construction (29 CFR 1926.62), etc.), as applicable.

Prior to disposal, all waste generated must be analyzed using EPA Method 1311 - Toxicity Characteristic Leachate Procedure (TCLP) - Lead by Atomic Absorption Spectrophotometry (AAS) for waste classification purposes. Waste found to have a leachability greater than or equal to 5 ppm of lead (Pb) must be disposed of as hazardous waste, and waste with a leachability of less than 5 ppm can be disposed of as a solid waste. Any painted surfaces not tested as detailed in this report shall be treated as Pb-containing and/or LBP until tested to confirm otherwise.

Should you have any questions or require additional information, please do not hesitate to contact me at (914) 232-7355.

Sincerely,

Environmental Maintenance Contractors, Inc.

Alan Ciriaco

Vice President of Operations

Attachment(s): XRF Analyzer Data Sheet and Certifications

Serial # Xlp300A-9069NR7213

XRF ANALYZER DATA SHEETS

Location: Jackson Ave Pump Station

Inspection Date: April 19, 2022

Ranges (NEG<INC<POS): Device PCS

Units mg/cm^2

Reading No	Time	Component	Substrate	Side	Condition	Color	Floor	Room	Results	PbC
1	4/19/2022 8:27			CALIBRATE					Positive	1.2
2	4/19/2022 8:29			CALIBRATE					Positive	1.1
3	4/19/2022 8:31			CALIBRATE					Positive	1.1
4	4/19/2022 8:31			CALIBRATE					Negative	0
5	4/19/2022 8:31			CALIBRATE					Negative	0
6	4/19/2022 8:31			CALIBRATE					Negative	0
7	4/19/2022 8:34	INT DOOR	METAL	A	INTACT	RED	GROUND FLOOR	1	Negative	0
8	4/19/2022 8:34	INT DOOR JAMB	METAL	A	INTACT	RED	GROUND FLOOR	1	Negative	0
9	4/19/2022 8:35	INT DOOR STOP	METAL	A	INTACT	RED	GROUND FLOOR	1	Negative	0
10	4/19/2022 8:35	INT DOOR FRAME	METAL	A	INTACT	RED	GROUND FLOOR	1	Negative	0.02
11	4/19/2022 8:36	INT DOOR FRAME	METAL	C	INTACT	RED	GROUND FLOOR	1	Negative	0
12	4/19/2022 8:37	INT DOOR JAMB	METAL	C	INTACT	RED	GROUND FLOOR	1	Negative	0
13	4/19/2022 8:37	INT DOOR	METAL	C	INTACT	RED	GROUND FLOOR	1	Negative	0
14	4/19/2022 8:38	EXT DOOR	METAL	A	INTACT	RED	GROUND FLOOR	1	Negative	0
15	4/19/2022 8:39	EXT DOOR JAMB	METAL	A	INTACT	RED	GROUND FLOOR	1	Negative	0
16	4/19/2022 8:39	EXT DOOR FRAME	METAL	A	INTACT	RED	GROUND FLOOR	1	Negative	0
17	4/19/2022 8:40	EXT DOOR FRAME	METAL	C	INTACT	RED	GROUND FLOOR	1	Negative	0
18	4/19/2022 8:41	EXT DOOR	METAL	C	INTACT	RED	GROUND FLOOR	1	Negative	0
19	4/19/2022 8:42	CEILING	PLASTER		INTACT	WHITE	GROUND FLOOR	1	Negative	0
20	4/19/2022 8:44	WORKBENCH	WOOD		INTACT	BLUE	SUB FLOOR 1	1	Negative	0.07
21	4/19/2022 8:46	PUMP PIPES	METAL		PEELING	GREEN	SUB FLOOR 2	1	Negative	0
22	4/19/2022 8:48	PUMP	METAL		INTACT	BLACK	SUB FLOOR 2	1	Negative	0
23	4/19/2022 8:50			CALIBRATE					Positive	2
24	4/19/2022 8:52			CALIBRATE					Positive	1.1
25	4/19/2022 8:52			CALIBRATE					Positive	1.1

	26	4/19/2022 8:52			CALIBRATE					Negative	0
	27	4/19/2022 8:53			CALIBRATE					Negative	0
	28	4/19/2022 8:53			CALIBRATE					Negative	0

Serial # Xlp300A-9069NR7213
 XRF ANALYZER DATA SHEETS
 Location: Saxon Woods Pump Station
 Inspection Date: April 19, 2022
 Ranges (NEG<INC<POS): Device PCS
 Units mg/cm^2

Reading No	Time	Component	Substrate	Side	Condition	Color	Floor	Room	Results	PbC
29	4/19/2022 9:59			CALIBRATE					Positive	1.1
30	4/19/2022 10:00			CALIBRATE					Positive	1.2
31	4/19/2022 10:00			CALIBRATE					Positive	1.2
32	4/19/2022 10:00			CALIBRATE					Negative	0
33	4/19/2022 10:00			CALIBRATE					Negative	0
34	4/19/2022 10:01			CALIBRATE					Negative	0
35	4/19/2022 10:03	MANHOLE EXT	METAL		PEELING	RED	GROUND	1	Positive	1.2
36	4/19/2022 10:04	MANHOLE INT	METAL		PEELING	WHITE	GROUND	1	Negative	0
37	4/19/2022 10:05	MANHOLE RAILING	METAL		PEELING	GREEN	GROUND	1	Negative	0.29
38	4/19/2022 10:06	GENERATOR	METAL		PEELING	GREEN	GROUND	1	Negative	0
39	4/19/2022 10:07	CABINET	METAL		PEELING	RED	GROUND	1	Negative	0.15
40	4/19/2022 10:12	WALL	METAL		PEELING	WHITE	SUB 1	1	Negative	0
41	4/19/2022 10:12	PUMP	METAL		PEELING	BEIGE	SUB 1	1	Negative	0
42	4/19/2022 10:14	PUMP SHUTOFF VALVE	METAL		PEELING	WHITE	SUB 1	1	Negative	0
43	4/19/2022 10:15	PUMP HORIZONTAL PIPE	METAL		PEELING	WHITE	SUB 1	1	Negative	0
44	4/19/2022 10:16	PUMP VERTICAL PIPE	METAL		PEELING	WHITE	SUB 1	1	Negative	0.5
45	4/19/2022 10:17	CEILING	METAL		PEELING	WHITE	SUB 1	1	Negative	0
46	4/19/2022 10:20			CALIBRATE					Positive	1.1
47	4/19/2022 10:20			CALIBRATE					Positive	1.1
48	4/19/2022 10:21			CALIBRATE					Positive	1
49	4/19/2022 10:22			CALIBRATE					Negative	0
50	4/19/2022 10:22			CALIBRATE					Negative	0
51	4/19/2022 10:22			CALIBRATE					Negative	0

Serial # Xlp300A-9069NR7213

XRF ANALYZER DATA SHEETS

Location: Fifth Ave Pump Station

Inspection Date: April 19, 2022

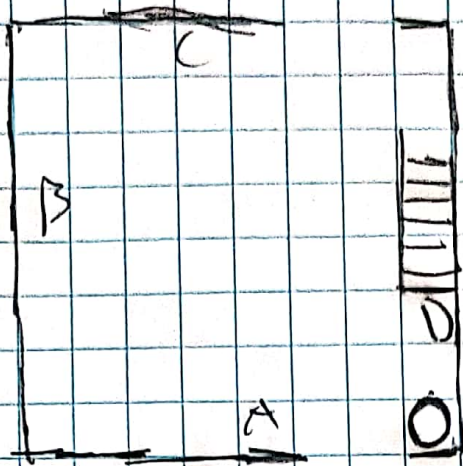
Ranges (NEG<INC<POS): Device PCS

Units mg/cm^2

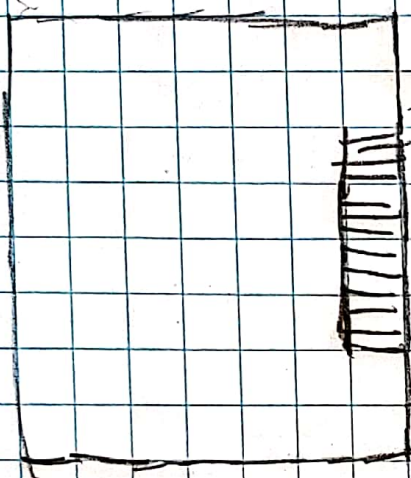
Reading No	Time	Component	Substrate	Side	Condition	Color	Floor	Room	Results	PbC
52	4/19/2022 11:01			CALIBRATE					Positive	1.2
53	4/19/2022 11:02			CALIBRATE					Positive	1.1
54	4/19/2022 11:02			CALIBRATE					Positive	1.1
55	4/19/2022 11:02			CALIBRATE					Negative	0
56	4/19/2022 11:02			CALIBRATE					Negative	0
57	4/19/2022 11:03			CALIBRATE					Negative	0
58	4/19/2022 11:05	INT DOOR	METAL	A	FAIR	GREY	GROUND	1	Negative	0.04
59	4/19/2022 11:05	INT DOOR JAMB	METAL	A	FAIR	GREY	GROUND	1	Negative	0.1
60	4/19/2022 11:05	INT DOOR STOP	METAL	A	FAIR	GREY	GROUND	1	Negative	0.04
61	4/19/2022 11:06	INT DOOR FRAME	METAL	A	FAIR	GREY	GROUND	1	Negative	0.02
62	4/19/2022 11:06	INT DOOR FRAME	METAL	C	FAIR	GREY	GROUND	1	Negative	0
63	4/19/2022 11:07	INT DOOR JAMB	METAL	C	FAIR	GREY	GROUND	1	Negative	0
64	4/19/2022 11:07	INT DOOR STOP	METAL	C	FAIR	GREY	GROUND	1	Negative	0
65	4/19/2022 11:07	INT DOOR	METAL	C	FAIR	GREY	GROUND	1	Negative	0
66	4/19/2022 11:08	EXT DOOR	METAL	C	FAIR	GREY	GROUND	1	Negative	0.01
67	4/19/2022 11:08	EXT DOOR FRAME	METAL	C	FAIR	GREY	GROUND	1	Negative	0
68	4/19/2022 11:09	EXT DOOR JAMB	METAL	C	FAIR	GREY	GROUND	1	Negative	0
69	4/19/2022 11:10	EXT DOOR	METAL	A	FAIR	GREY	GROUND	1	Negative	0
70	4/19/2022 11:10	EXT DOOR FRAME	METAL	A	FAIR	GREY	GROUND	1	Negative	0.02
71	4/19/2022 11:10	EXT DOOR JAMB	METAL	A	FAIR	GREY	GROUND	1	Negative	0.08
72	4/19/2022 11:11	STAIR HIGH VIS STRIP	CONCRETE		POOR	YELLOW	GROUND	1	Negative	0
73	4/19/2022 11:13	TABLE	METAL		FAIR	BROWN	SUB FLOOR 1	1	Negative	0.06
74	4/19/2022 11:14	STAIR HIGH VIS STRIP	CONCRETE		FAIR	YELLOW	SUB FLOOR 1	1	Negative	0
75	4/19/2022 11:41	WALL	CONCRETE	A	FAIR	WHITE	SUB FLOOR 1	1	Negative	0.01
76	4/19/2022 11:15	PUMP	METAL		FAIR	GREY	SUB FLOOR 2	1	Negative	0

77	4/19/2022 11:16	PUMP PIPES	METAL		FAIR	GREY	SUB FLOOR 2	1	Negative	0.01
78	4/19/2022 11:17	PUMP PIPE WALL CAP	METAL	B	POOR	GREY	SUB FLOOR 2	1	Positive	1.3
79	4/19/2022 11:19	PUMP PIPE WALL	METAL	B	POOR	GREY	SUB FLOOR 2	1	Negative	0.5
80	4/19/2022 11:20	HORIZONTAL PIPE	METAL	C	FAIR	GREY	SUB FLOOR 2	1	Negative	0.15
81	4/19/2022 11:44			CALIBRATE					Positive	1.1
82	4/19/2022 11:45			CALIBRATE					Positive	1.1
83	4/19/2022 11:45			CALIBRATE					Positive	1.1
84	4/19/2022 11:46			CALIBRATE					Negative	0
85	4/19/2022 11:46			CALIBRATE					Negative	0
86	4/19/2022 11:46			CALIBRATE					Negative	0

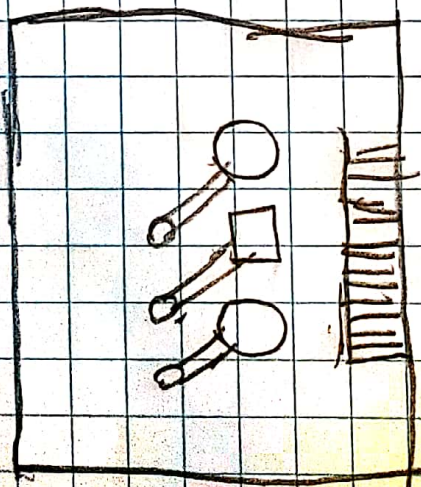
Jackson Ave



ground floor

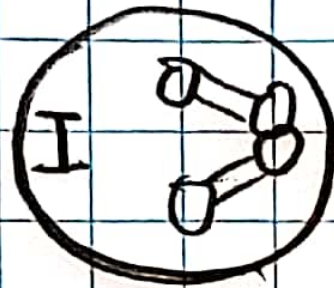
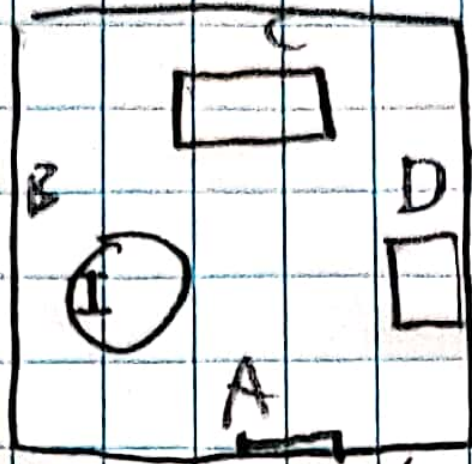


Sub Floor 1



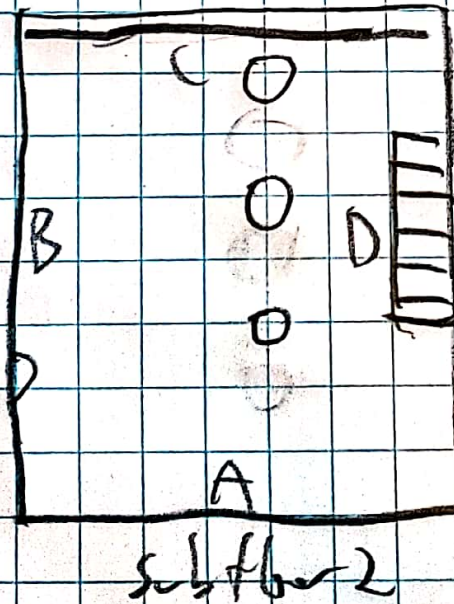
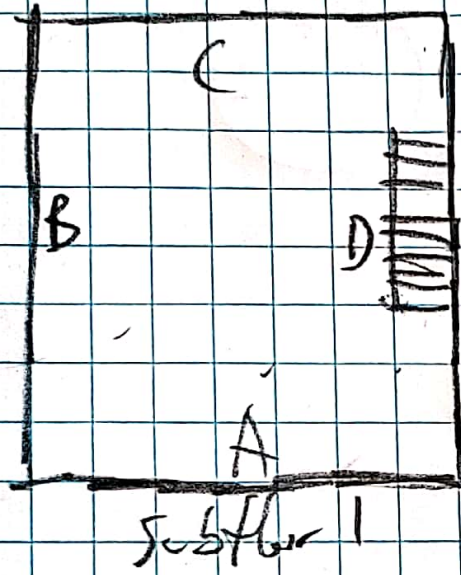
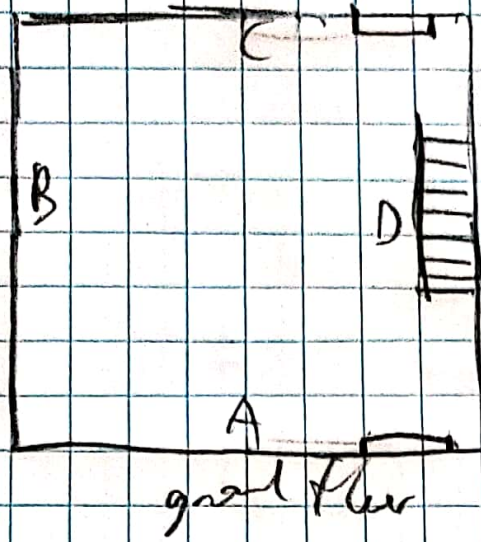
Sub Floor 2

Saxon Woods



sub floor.1

5th Avenue



United States Environmental Protection Agency

This is to certify that



Kristofer Yee

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Inspector

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires

April 25, 2025

LBP-I-1234354-1

Certification #

April 11, 2022

Issued On



Ben Conetta, Chief

Chemicals and Multimedia Programs Branch



United States Environmental Protection Agency

This is to certify that

Environmental Maintenance Contractors, Inc.

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires October 06, 2023

LBP-62470-2

Certification #

January 03, 2020

Issued On



Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch



ENVIRONMENTAL MAINTENANCE CONTRACTORS, INC.

Environmental Consulting, Testing, Reporting and Remedial / Abatement Services

May 11, 2022

Ray Schofield
Senior Project Manager - Engineering Division
Environmental Design & Research
217 Montgomery Street, Suite 1100
Syracuse, New York 13202

Phone: (315) 471-0688
Email: rschofield@edrdoc.com

LIMITED POLYCHLORINATED BIPHENYLS INSPECTION REPORT FOR THE WESTCHESTER COUNTY PUMP STATIONS

SUBJECT PROPERTIES

The subject properties include the three (3) pump stations in Westchester County, NY as listed below:

- Jackson Avenue Pump Station in Hastings-on-Hudson
- Saxon Woods Pump Station in New Rochelle
- Fifth Avenue Pump Station in New Rochelle

TARGET AREAS

The Target Areas include the interior and exterior of the subject properties.

INSPECTION RATIONALE

Environmental Maintenance Contractors, Inc. (EMC) was retained to perform a non-destructive limited inspection of the Target Areas including sample collection of readily accessible suspect Polychlorinated Biphenyls (PCBs) containing glazings and caulking. No penetrations, dismantling or exploratory demolition was performed while performing this limited inspection.

INSPECTION AND BULK SAMPLE COLLECTION

The Target Areas were inspected for suspect PCB-containing glazings and caulking on April 19, 2022.

INSPECTION PROTOCOL

The purpose of the inspection was to identify readily accessible PCB-containing glazings and caulking within the Target Areas. To perform this inspection, EMC's HazMat Technicians visited all accessible areas within the Target Areas and collected samples of representative suspect PCB-containing glazings and caulking.

INACCESSIBLE AREAS

Access was available to all Target Areas.

LABORATORY

Following collection of bulk samples, the samples were submitted to Phoenix Environmental Laboratories, Inc. (Phoenix) located at 587 East Middle Turnpike, Manchester, CT 06040. Phoenix is a laboratory accredited by the *New York State Department of Health (NYS DOH) National Environmental Laboratory Accreditation Conference (NELAC)* and by the *Environmental Laboratory Approval Program (ELAP)* for analysis for total PCB content. All samples collected were analyzed via EPA Method Soxhlet SW3540C Extraction. This method is a procedure for extracting nonvolatile and semivolatile organic compounds from solids such as soils, sludges, and wastes.

SAMPLED MATERIALS

The following is a listing of the suspect PCB-containing glazings and caulking collected from the Target Areas and submitted for analysis for the purpose of this report:

Jackson Avenue Pump Station:

- Door Caulking
- Vent Caulking - Exterior

Saxon Woods Pump Station:

- No suspect PCB-containing materials

Fifth Avenue Pump Station:

- Grey Vent Caulking
- White Vent Caulking
- Floor Caulking
- Window Glazing

RESULTS AND QUANTITIES

Sample analysis indicates that the following materials were not found to contain PCBs and are therefore deemed non PCB-containing materials.

CONCLUSIONS

The limited PCB survey **did not** identify readily accessible PCB-containing glazings and caulking within the Target Areas of the Jackson Avenue Pump Station, Saxon Woods Pump Station, and Fifth Avenue Pump Station in Westchester County, NY. Please find attached the laboratory data report for samples that were collected.

Based on the nature of this inspection, it is possible that unidentified suspect PCB-containing materials may be uncovered and/or encountered during the scope of work. Any other suspect PCB-containing materials encountered during the scope of work that have not been inspected as detailed in this report shall be treated as if it contains PCB-containing until properly inspected and/or tested by a qualified individual/firm to confirm otherwise.

Should you have any questions or require additional information, please do not hesitate to contact me at (914) 232-7355.

Sincerely,

Environmental Maintenance Contractors, Inc.

Allan Ciriaco
Vice President of Operations

Attachment(s): Laboratory Sample Results



Friday, April 22, 2022

Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Project ID: JACKSON PUMP STATEN
SDG ID: GCL12047
Sample ID#s: CL12047 - CL12048

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Phyllis Shiller".

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Sample Id Cross Reference

April 22, 2022

SDG I.D.: GCL12047

Project ID: JACKSON PUMP STATEN

Client Id	Lab Id	Matrix
DOOR CAULKING	CL12047	CAULK
VENT CAULK EXT	CL12048	CAULK



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

April 22, 2022

FOR: Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Sample Information

Matrix: CAULK
Location Code: EMCI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: LB
Analyzed by: see "By" below

Date

04/19/22
04/19/22

Time

8:15
16:28

Laboratory Data

SDG ID: GCL12047
Phoenix ID: CL12047

Project ID: JACKSON PUMP STATEN
Client ID: DOOR CAULKING

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				04/20/22	X/K/H	SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1221	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1232	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1242	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1248	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1254	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1260	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1262	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1268	ND	650	ug/Kg	1	04/21/22	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	70		%	1	04/21/22	SC	30 - 150 %
% DCBP (Confirmation)	60		%	1	04/21/22	SC	30 - 150 %
% TCMX	61		%	1	04/21/22	SC	30 - 150 %
% TCMX (Confirmation)	58		%	1	04/21/22	SC	30 - 150 %

Project ID: JACKSON PUMP STATEN
Client ID: DOOR CAULKING

Phoenix I.D.: CL12047

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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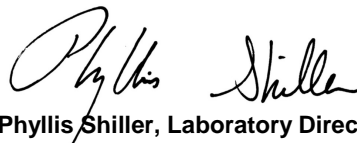
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

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Phyllis Shiller, Laboratory Director

April 22, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

April 22, 2022

FOR: Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Sample Information

Matrix: CAULK
Location Code: EMCI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: LB
Analyzed by: see "By" below

Date

04/19/22
04/19/22

Time

8:22
16:28

Laboratory Data

SDG ID: GCL12047
Phoenix ID: CL12048

Project ID: JACKSON PUMP STATEN
Client ID: VENT CAULK EXT

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				04/20/22	X/K/H	SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1221	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1232	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1242	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1248	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1254	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1260	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1262	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1268	ND	890	ug/Kg	2	04/21/22	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	75		%	2	04/21/22	SC	30 - 150 %
% DCBP (Confirmation)	67		%	2	04/21/22	SC	30 - 150 %
% TCMX	62		%	2	04/21/22	SC	30 - 150 %
% TCMX (Confirmation)	53		%	2	04/21/22	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL

BRL=Below Reporting Level L=Biased Low

QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

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Phyllis Shiller, Laboratory Director

April 22, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



QA/QC Report

April 22, 2022

QA/QC Data

SDG I.D.: GCL12047

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 621124 (ug/Kg), QC Sample No: CL10487 10X (CL12047, CL12048)										
<u>Polychlorinated Biphenyls</u>										
PCB-1016	ND	170	63	69	9.1				40 - 140	30
PCB-1221	ND	170							40 - 140	30
PCB-1232	ND	170							40 - 140	30
PCB-1242	ND	170							40 - 140	30
PCB-1248	ND	170							40 - 140	30
PCB-1254	ND	170							40 - 140	30
PCB-1260	ND	170	62	72	14.9				40 - 140	30
PCB-1262	ND	170							40 - 140	30
PCB-1268	ND	170							40 - 140	30
% DCBP (Surrogate Rec)	62	%	67	78	15.2				30 - 150	30
% DCBP (Surrogate Rec) (Confirm)	56	%	66	69	4.4				30 - 150	30
% TCMX (Surrogate Rec)	48	%	57	65	13.1				30 - 150	30
% TCMX (Surrogate Rec) (Confirm)	51	%	58	65	11.4				30 - 150	30

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference

LCS - Laboratory Control Sample


LCSD - Laboratory Control Sample Duplicate

MS - Matrix Spike

MS Dup - Matrix Spike Duplicate

NC - No Criteria

Intf - Interference


Phyllis Shiller, Laboratory Director
April 22, 2022

Friday, April 22, 2022

Sample Criteria Exceedances Report

Criteria: None
State: NY

GCL12047 - EMCI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
--------	-------	-----------------	----------	--------	----	----------	----	----------------

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



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Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

April 22, 2022

SDG I.D.: GCL12047

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



NY Temperature Narration

April 22, 2022

SDG I.D.: GCL12047

The samples in this delivery group were received at 2.1°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)



NY/NJ/PA CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823

Client Services (860) 645-8726

Customer: Environmental Protection, Inc.

Address: 333 Lexington Avenue, 11th Floor

Project: Environmental Protection, Inc.

Report to: Richard Frank

Invoice to: CMC, Inc.

QUOTE # : 16549

Phone: ☐

Fax: ☐

Email: ☐

Project P.O.:

This section **MUST** be completed with Bottle Quantities.

Sampler's Signature: [Signature] Date: 4/14/12

Matrix Code: D
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe
Oil=Oil B=Bulk L=Liquid

PHOENIX USE ONLY	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
12049	Deer Calkin	D	4/14/12	08:15
12048	Van Calkin-Gut	D	4/14/12	08:12

Analysis Request

GL Amber 8 oz WH3PO4
GL VOA Vial () or
GL Soil container () or
GL Amber 1000ml () or
PL Asie () HCl
PL H2SO4 () 500ml () 1000ml
PL NaOH 250ml
Bacteria Bottle as is
Bacteria Bottle as is

Relinquished by: [Signature] Date: 4/14/12
Accepted by: [Signature] Date: 4-14-12 15:15
Comments, Special Requirements or Regulations: [Signature]

Data Format:

☐ Phoenix Std Report
☐ Excel
☒ PDF
☐ GIS/Key

EQUS
NJ Hazsite EDD
NY EZ EDD (ASP)
Other

Turnaround:

☐ 1 Day*
☐ 2 Days*
☒ 3 Days*
☐ 5 Days
☐ 10 Days
☐ Other

* SURCHARGE APPLIES

NJ

Res. Criteria
Non-Res. Criteria
Impact to GW Soil Cleanup Criteria
Impact to GW soil screen Criteria
GW Criteria

PA

TOGS GW
CP-51 SOIL
375SSCO
Unrestricted Soil
375SSCO
Residential Soil
375SSCO
Restricted Soil
375SSCO
Commercial Soil
375SSCO
Industrial Soil
Subpart 5 DW

PA

Clean Fill Limits
PA-GW
Reg Fill Limits
PA Soil Restricted
PA Soil non-restricted

State Samples Collected?

[Signature]



Friday, April 22, 2022

Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Project ID: FIFTH AVE.
SDG ID: GCL12043
Sample ID#s: CL12043 - CL12046

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Phyllis Shiller".

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Sample Id Cross Reference

April 22, 2022

SDG I.D.: GCL12043

Project ID: FIFTH AVE.

Client Id	Lab Id	Matrix
GREY VENT CAULK	CL12043	CAULK
WHITE VENT CAULK	CL12044	CAULK
FLOOR CAULK	CL12045	CAULK
WINDOW GLAZING	CL12046	CAULK



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

April 22, 2022

FOR: Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Sample Information

Matrix: CAULK
Location Code: EMCI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: LB
Analyzed by: see "By" below

Date

04/19/22
04/19/22

Time

11:41
16:28

Laboratory Data

SDG ID: GCL12043
Phoenix ID: CL12043

Project ID: FIFTH AVE.
Client ID: GREY VENT CAULK

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				04/20/22	X/K/H	SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1221	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1232	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1242	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1248	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1254	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1260	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1262	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1268	ND	980	ug/Kg	2	04/21/22	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	41		%	2	04/21/22	SC	30 - 150 %
% DCBP (Confirmation)	40		%	2	04/21/22	SC	30 - 150 %
% TCMX	33		%	2	04/21/22	SC	30 - 150 %
% TCMX (Confirmation)	33		%	2	04/21/22	SC	30 - 150 %

Project ID: FIFTH AVE.
Client ID: GREY VENT CAULK

Phoenix I.D.: CL12043

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

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Phyllis Shiller, Laboratory Director

April 22, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

April 22, 2022

FOR: Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Sample Information

Matrix: CAULK
Location Code: EMCI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: LB
Analyzed by: see "By" below

Date

04/19/22
04/19/22

Time

11:47
16:28

Laboratory Data

SDG ID: GCL12043
Phoenix ID: CL12044

Project ID: FIFTH AVE.
Client ID: WHITE VENT CAULK

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				04/20/22	X/K/H	SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1221	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1232	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1242	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1248	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1254	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1260	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1262	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
PCB-1268	ND	780	ug/Kg	1	04/21/22	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	66		%	1	04/21/22	SC	30 - 150 %
% DCBP (Confirmation)	58		%	1	04/21/22	SC	30 - 150 %
% TCMX	54		%	1	04/21/22	SC	30 - 150 %
% TCMX (Confirmation)	53		%	1	04/21/22	SC	30 - 150 %

Project ID: FIFTH AVE.

Phoenix I.D.: CL12044

Client ID: WHITE VENT CAULK

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
-----------	--------	------------	-------	----------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL

BRL=Below Reporting Level L=Biased Low

QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

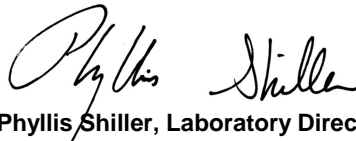
Comments:

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Phyllis Shiller, Laboratory Director

April 22, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

April 22, 2022

FOR: Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Sample Information

Matrix: CAULK
Location Code: EMCI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: LB
Analyzed by: see "By" below

Date

04/19/22
04/19/22

Time

11:49
16:28

Laboratory Data

SDG ID: GCL12043
Phoenix ID: CL12045

Project ID: FIFTH AVE.
Client ID: FLOOR CAULK

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				04/20/22	X/K/H	SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1221	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1232	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1242	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1248	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1254	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1260	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1262	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
PCB-1268	ND	780	ug/Kg	5	04/21/22	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	90		%	5	04/21/22	SC	30 - 150 %
% DCBP (Confirmation)	88		%	5	04/21/22	SC	30 - 150 %
% TCMX	91		%	5	04/21/22	SC	30 - 150 %
% TCMX (Confirmation)	77		%	5	04/21/22	SC	30 - 150 %

Project ID: FIFTH AVE.
Client ID: FLOOR CAULK

Phoenix I.D.: CL12045

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
-----------	--------	------------	-------	----------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

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Phyllis Shiller, Laboratory Director

April 22, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

April 22, 2022

FOR: Attn: Richard Stumbo
EMCI
333 Lexington Avenue
Mt. Kisco, NY 10549

Sample Information

Matrix: CAULK
Location Code: EMCI
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: LB
Analyzed by: see "By" below

Date

04/19/22
04/19/22

Time

11:53
16:28

Laboratory Data

SDG ID: GCL12043
Phoenix ID: CL12046

Project ID: FIFTH AVE.
Client ID: WINDOW GLAZING

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				04/20/22	X/K/H	SW3540C
<u>PCB (Soxhlet SW3540C)</u>							
PCB-1016	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1221	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1232	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1242	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1248	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1254	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1260	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1262	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
PCB-1268	ND	820	ug/Kg	2	04/21/22	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	76		%	2	04/21/22	SC	30 - 150 %
% DCBP (Confirmation)	72		%	2	04/21/22	SC	30 - 150 %
% TCMX	60		%	2	04/21/22	SC	30 - 150 %
% TCMX (Confirmation)	64		%	2	04/21/22	SC	30 - 150 %

Project ID: FIFTH AVE.
Client ID: WINDOW GLAZING

Phoenix I.D.: CL12046

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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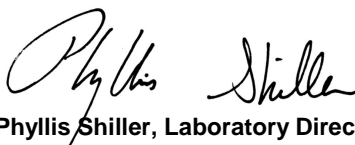
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director

April 22, 2022

Reviewed and Released by: Rashmi Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



QA/QC Report

April 22, 2022

QA/QC Data

SDG I.D.: GCL12043

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 621124 (ug/Kg), QC Sample No: CL10487 10X (CL12043, CL12044, CL12045, CL12046)										
<u>Polychlorinated Biphenyls</u>										
PCB-1016	ND	170	63	69	9.1				40 - 140	30
PCB-1221	ND	170							40 - 140	30
PCB-1232	ND	170							40 - 140	30
PCB-1242	ND	170							40 - 140	30
PCB-1248	ND	170							40 - 140	30
PCB-1254	ND	170							40 - 140	30
PCB-1260	ND	170	62	72	14.9				40 - 140	30
PCB-1262	ND	170							40 - 140	30
PCB-1268	ND	170							40 - 140	30
% DCBP (Surrogate Rec)	62	%	67	78	15.2				30 - 150	30
% DCBP (Surrogate Rec) (Confirm)	56	%	66	69	4.4				30 - 150	30
% TCMX (Surrogate Rec)	48	%	57	65	13.1				30 - 150	30
% TCMX (Surrogate Rec) (Confirm)	51	%	58	65	11.4				30 - 150	30

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference

LCS - Laboratory Control Sample

LCSD - Laboratory Control Sample Duplicate

MS - Matrix Spike

MS Dup - Matrix Spike Duplicate

NC - No Criteria

Intf - Interference

Phyllis Shiller, Laboratory Director
April 22, 2022

Friday, April 22, 2022

Sample Criteria Exceedances Report

GCL12043 - EMCI

Criteria: None
State: NY

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
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*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



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Analysis Comments

April 22, 2022

SDG I.D.: GCL12043

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



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NY Temperature Narration

April 22, 2022

SDG I.D.: GCL12043

The samples in this delivery group were received at 2.1°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

