
**Contract Documents
for
North Broadway Ultraviolet Disinfection
Town of North Castle, New York**



GHD CONSULTING SERVICES INC.
One Remington Park Drive
Cazenovia, New York



It is a violation of the New York State Education Law for any person unless he is acting under the direction of a licensed professional engineer, to alter an item on this specification in any way. If an item is altered, the altering engineer shall affix to the item his seal and the notation "altered by" followed by his signature and the date of such alteration, and a specific description of the alteration.

2015

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INVITATION TO BID
NORTH BROADWAY ULTRAVIOLET DISINFECTION
TOWN OF NORTH CASTLE, NEW YORK

Sealed Bids for construction of a UV disinfection system at the existing North Broadway Booster Pump Station for the Town of North Castle, NY will be received by the Town Clerk in her office at 15 Bedford Road, Armonk, NY until 2:00 p.m. local time on December 1, 2015 and at that place and time will be publicly opened and read aloud.

The work consists of constructing, complete with all equipment and accessories, a building expansion on the existing North Broadway Booster Pump Station, a UV disinfection system, new pump station controls, and other work in accordance with the Bidding Documents heretofore prepared by GHD Consulting Services Inc.

All Bidders must register as a planholder with GHD (contact information below) in order to receive addenda, if any. Confirmation of addendum receipt is required on the bid forms. Bidding Documents and plans may be obtained from GHD by contacting and registering with:

Christine Williams
GHD Consulting Services Inc.
One Remington Park Drive
Cazenovia, NY 13035
(315) 679-5800
christine.williams@ghd.com

The Contract Documents may be examined on the Town website <http://www.northcastleny.com> and at the following locations:

GHD Consulting Services Inc.
150 Grand Street
White Plains, NY 10601

Office of Town Clerk
15 Bedford Road
Armonk, NY 10504

Construction Contractors Association
of the Hudson Valley
330 Meadow Avenue
Newburgh, NY 12550

Southern Tier Builders Association, Inc.
65 East Main Street
Falconer, NY 14733

To obtain a printed copy of the Bidding Documents, a deposit of \$100 in the form of a check or money order payable to GHD Consulting Services Inc. will be required. If mailing of documents is requested, a separate check payable to GHD Consulting Services Inc. in the amount of \$20 per set must be included with the request to cover handling and postage fees. No refunds will be made for the return of Bidding Documents. As an alternative, the Bidding Documents may be obtained from GHD in electronic (.pdf) format only, with no deposit required. All questions regarding distribution of Bidding Documents shall be directed to Christine Williams at GHD via the contact information provided above.

All other questions shall be submitted in writing to Nicholas Hyde, P.E. at Nicholas.hyde@ghd.com. The subject heading for all e-mails and faxes shall be:

Subject: North Castle North Broadway UV Disinfection

No response will be given to questions received less than eight days before the Bid opening date.

Bidders shall review and acknowledge all Addenda on the Bid Form.

A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid Bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions.

If, upon acceptance of a Bid, a Bidder fails to enter into a Contract with the Town of North Castle, the bid security shall be forfeited to and become the property of the Town.

No Bidder may withdraw its Bid within 60 days after the date of the Bid opening. The successful Bidder must furnish a 100% Performance Bond and a 100% Payment Bond with a surety company satisfactory to the Town of North Castle and conforming to the prerequisite requirements of Article 5 of the General Conditions on the forms included in the Bidding Documents.

The Town of North Castle reserves the right to waive any informalities or to reject any or all Bids.

Bidders are required to certify, under penalty of perjury, that Bids have been prepared without collusion with other Bidders, subcontractors, suppliers, etc. This certification is included with the Bid Form and each Bidder must sign in the space provided.

A non-mandatory pre-bid conference will be held at 10:00 a.m. on the 10th day of November at the Town Hall Meeting Room, 15 Bedford Road, Armonk, NY 10504. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference.

Ann Curran, Town Clerk

Dated: _____

SECTION 00100

INSTRUCTIONS TO BIDDERS

ARTICLE 1 - DEFINED TERMS

- 1.01. Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. Issuing Office - The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.
 - B. Prefixes to Referenced Paragraph Numbers are as follows:

General Conditions; "GC-____.".
Supplementary Conditions; "SC-____."

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

- 2.01. Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the advertisement or invitation to bid may be obtained from the Issuing Office. The deposit will be refunded to each document holder of record who returns a complete set of Bidding Documents in good condition within 30 days after opening of Bids.
- 2.02. Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03. Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

- 3.01. To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's and/or Engineer's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be identified herein or requested by Owner and/or Engineer..
- A. Evidence of Bidder's authority to do business in the state where the Project is located
 - B. Bidder's state contractor License number, if applicable.
- 3.02. Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

- 4.01. Subsurface and Physical Conditions
- A. The Supplementary Conditions identify:

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1. Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site.
 2. Those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except underground facilities).
- B. Copies of reports and drawings referenced in Paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents. Bidder is responsible for any interpretation or conclusion Bidder draws from any data, interpretations, opinions or information contained in such reports or shown or indicated in such drawings.
- 4.02. Underground Facilities
- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner or others.
- 4.03. Hazardous Environmental Condition
- A. The Supplementary Conditions identify any reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.
- B. Copies of such reports and drawings referenced in Paragraph 4.03A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents. Bidder is responsible for any interpretation or conclusion Bidder draws from any data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
- 4.04. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in paragraph 4.06 of the General Conditions.
- 4.05. On written request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06. Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is planned to be performed at the Site by others (such as utilities, other prime contractors, and Owner) that relates to the Work contemplated by these Bidding Documents. On request, Owner will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work if they exist.

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- A. Paragraph 6.13.C of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.07. It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions, and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in the Paragraph 4.06 of the Supplementary Conditions;
- E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;
- F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
- I. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
- J. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.08. The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any

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specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 - PRE-BID CONFERENCE

- 5.01. A pre-Bid conference will be held as indicated in the Invitation to Bid.

ARTICLE 6 - SITE AND OTHER AREAS

- 6.01. The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

- 7.01. All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Questions received after the deadline stated at the Pre-Bid Meeting or as modified in subsequent Addenda will not be answered.
- 7.02. Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

ARTICLE 8 - BID SECURITY

- 8.01. A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check, bank money order, or a Bid Bond (on the form attached) issued by a surety meeting the requirements of paragraphs 5.01 and 5.02 of the General Conditions.
- 8.02. The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award and the Bid Security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 8.03. Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

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ARTICLE 9 - CONTRACT TIMES

- 9.01. The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 - LIQUIDATED DAMAGES

- 10.01. Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS AND OTHERS

- 12.01. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 12.02. If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06 of the General Conditions.
- 12.03. Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 13 - PREPARATION OF BID

- 13.01. The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Engineer.
- 13.02. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be

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indicated for each section, Bid Item, alternative, adjustment unit price item, and unit price item listed therein. In the case of optional alternatives, the words "No Bid," "No Change," or "Not Applicable" may be entered.

- 13.03. A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.
- 13.04. A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 13.05. A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 13.06. A Bid by an individual shall show the Bidder's name and official address.
- 13.07. A Bid by a joint venture shall be executed by each joint venture in the manner indicated on the Bid form. The official address of the joint venture must be shown.
- 13.08. All names shall be printed in ink below the signatures.
- 13.09. The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.10. Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.11. The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state Contractor license number, if any, shall also be shown on the Bid Form.
- 13.12. All engineering redesign to facilitate an "or-equal" or substitute proposed by Bidder and accepted by Owner shall be done by Engineer. Reimbursement shall be as provided in Article 6.05 of the General Conditions.

ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS

14.01. Lump Sum

- A. Bidders shall submit a Bid on a lump sum basis as set forth in the Bid Form.

14.02. Unit Price

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.

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- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.03. Allowances

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 11.02.B of the General Conditions.

ARTICLE 15 - SUBMITTAL OF BID

- 15.01. With each copy of the Bidding Documents, a Bidder is furnished one copy of the Bid Form, and, if required, the Bid Bond Form. The copy of the Bid Form is to be completed and submitted with the Bid security and all required attachments to the Bid stated in the Bid Form.

- A. Required Bid Security in the form of a Bid Bond, certified check, or money order.
- B. Statement of Surety's Intent.
- C. Bidders Qualification Statement.
- D. List of Proposed Subcontractors.
- E. Contractor's License No.: _____ or Evidence of Bidder's Ability to Obtain a State Contractor's License.
- F. Non-Collusive Bidding Certification.
- G. Preliminary Statement of Utilization, Minority And Women's (W/MBE) Business Enterprises.
- H. Certification of Non-Segregated Facilities.
- I. EEO Policy Statement.
- J. Evidence that EPA Form 6100-2 was provided by Contractor to each MWBE Subcontractor.
- K. EPA Form 6100-3: DBE Subcontractor Performance Form.
- L. EPA Form 6100-4: DBE Subcontractor Utilization Form.
- M. Lobbying Certification for Contracts, Grants, Loans, And Cooperative Agreements, 40 CFR 34.
- N. AIS Contractor's Certification.

- 15.02. A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope

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containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED."

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

- 16.01. A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.
- 16.02. If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 - OPENING OF BIDS

- 17.01. Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01. All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid Security prior to the end of this period.

ARTICLE 19 - EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01. Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsive. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 19.02. More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 19.03. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 19.04. In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 19.05. Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

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- 19.06. If the Contract is to be awarded, Owner will award the Contract to the Bidder who is in the best interests of the Project.

ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

- 20.01. Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 21 - SIGNING OF AGREEMENT

- 21.01. When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 - COPIES OF CONTRACT DOCUMENTS

- 22.01. Owner will furnish copies of Contract Documents to Contractor as follows:

Three sets of full-size drawings.
Three sets of bound Contract Documents.

ARTICLE 23 - SALES AND USE TAXES

- 23.01. Owner is exempt from New York state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid. Refer to Paragraph 6.10 of the Supplementary Conditions for additional information.

ARTICLE 24 - FUNDING REQUIREMENTS

- 24.01. The project will be funded by the New York State Revolving Loan Fund through the New York State Environmental Facilities Corporation and is subject to the M/WBE participation goals as detailed in the Agreement. A preliminary statement of M/WBE utilization and other forms are required to be submitted with the Bid Form (refer to Exhibit E of the Agreement). All contractors are required to comply with these requirements.

ARTICLE 25 - RETAINAGE

- 25.01. Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Agreement.

ARTICLE 26 - AMERICAN IRON AND STEEL (AIS)

- 26.01. The use of American iron and steel is required in the construction of this project. Refer to Agreement Exhibit E, New York State Revolving Fund Bid Packet, for additional details.

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ARTICLE 27 - PREVAILING WAGE RATES

- 27.01. The Contractor must comply with the Davis Bacon Related Act (DBRA). Contractors must use the higher of the prevailing wage rates as set forth by the New York State Department of Labor (NYSDOL) or Federal wage rates and as outlined in the Supplementary Conditions.
- 27.02. New York State Department of Labor wage rates for this project are provided in Exhibit F of the Agreement and are available on the NYSDOL website. Federal wage rates are provided in Exhibit G. To retrieve the State wage rate schedule from the NYSDOL website, follow the steps outlined below:
- A. Go to <http://www.labor.ny.gov/workerprotection/publicwork/owsaccess.shtm>.
 - B. Click the "Wage Rate Selection Online" link.
 - C. Enter **#2015010153** as the PRC# for this project and click "Submit."
 - D. To download the schedule, click the link "Original Wage Schedule" in the upper right of the page.

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BID FORM

CONTRACTOR'S BID
FOR
CONSTRUCTION OF CONTRACT NO. 1 - GENERAL
NORTH BROADWAY ULTRAVIOLET DISINFECTION
TOWN OF NORTH CASTLE, NEW YORK

ARTICLE 1 - BID RECIPIENT

1.01. THIS BID IS SUBMITTED TO:

Town of North Castle
15 Bedford Road
Armonk, NY 10504

- 1.02. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

- 2.01. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01. In submitting this Bid, Bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in SC-4.02 as containing reliable "technical data", and (2) reports and drawings of Hazardous

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BID FORM

Environmental Conditions, if any, at the Site that have been identified in SC-4.06 as containing reliable "technical data."

- E. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.
- F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

ARTICLE 4 - BIDDER'S CERTIFICATION

4.01. Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Article:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at

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BID FORM

artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 - BASIS OF BID

- 5.01. Bidder will perform the Work in accordance with the Contract Documents for the prices shown in the Bid Schedule that follow.
- 5.02. Bidder acknowledges that Bidder's price(s) constitute Bidder's sole compensation for performing [all Work required by the Contract Documents] [all portions of the Work assigned to the specific Contractor required by the Contract Documents], and if a particular part of the Work is not listed specifically in the Bid Item Descriptions, Bidder has included that part of the Work in the Bid Item Description which it most logically belongs.

- A. Schedule A: Lump Sum Bid Items: Lump sum items include all Work in the Contract Documents except items specifically identified as Unit Price Work and Allowances.

Item No.	Description	Total Price
A-1	General Construction	\$
A-2	Construction Documentation (minimum price: \$5,000)	\$
A-3	Record Documents (minimum price \$5,000)	\$
Subtotal (Sum of Items A-1 through A-3)		\$

- B. Schedule B: Unit Price Work: Measurement and payment of Unit Price Work is defined in Section 01025, Unit Price Items.

1. Unit Prices have been computed in accordance with General Conditions Article 11.03.B.
2. Bidders acknowledge that estimated quantities are not guaranteed, and are solely for the purposes of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
B-1	Excavations Below Subgrade	Cubic Yards	5	\$	\$
B-2	Special Backfill Material	Cubic Yards	5	\$	\$

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BID FORM

Item No.	Description	Unit	Estimated Quantity	Unit Price	Bid Price
B-3	Additional Exploratory Excavations	Cubic Yards	50	\$	\$
B-4	Rock Removal	Cubic Yards	75	\$	\$
Subtotal (Sum of Items B-1 through B-4)					\$

C. Schedule F: Allowances:

1. Bidder agrees to provide the following allowances as part of the Work in accordance with General Conditions Article 11.02.
2. Engineer will consult with Contractor for consideration and selection of products and select products in consultation with Owner and transmit decision to Contractor. On notification of selection by Engineer, Contractor shall execute purchase agreement with designated Supplier, arrange for and process Shop Drawings and Samples, arrange for delivery, and promptly inspect products upon delivery for completeness, damage, and defects.

Item No.	Description	Total Price
F-1	Laboratory Equipment Allowance	\$10,000
F-2	Miscellaneous Additional Work	\$50,000
F-3	SCADA Software Allowance	\$13,000
Subtotal (Sum of Items F-1 and F-3)		\$73,000

D. Schedule G: Total Bid Price:

1. Determination of the apparent low Bidder shall be based on the Total Bid Price determined as follows.
2. All mathematical errors will be corrected. In case of a discrepancy between unit prices bid and extended totals, unit prices will govern. In case of discrepancy between the correct sum of individual bid items and the (incorrectly) calculated sum, the correct sum of individual bid items will govern.

Item No.	Total Price
Schedule A Total (Lump Sum Bid Items)	\$
Schedule B Total (Unit Price Work)	\$
Schedule F Total (Allowances)	\$73,000
Total Bid Price	\$

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BID FORM

TOTAL BID PRICE (in words)

ARTICLE 6 - NOT USED

ARTICLE 7 - TIME OF COMPLETION

- 7.01. Bidder agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 7.02. Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 8 - ATTACHMENTS TO THIS BID

- 8.01. The following documents are submitted with and made a condition of this Bid:
- A. Required Bid Security in the form of a Bid Bond.
 - B. Statement of Surety's Intent
 - C. Bidder's Qualification Statement
 - D. List of Proposed Subcontractors
 - E. Contractor's License No.: _____ or Evidence of Bidder's Ability to Obtain a State Contractor's License
 - F. Non-Collusive Bidding Certification
 - G. Preliminary Statement of Utilization, Minority and Women's (W/MBE) Business Enterprise
 - H. Certification of Non-Segregated Facilities
 - I. EEO Policy Statement
 - J. Evidence that EPA Form 6100-2 was provided by Contractor to each MWBE Subcontractor
 - K. EPA Form 6100-3: DBE Subcontractor Performance Form
 - L. EPA Form 6100-4: DBE Subcontractor Utilization Form
 - M. Lobbying Certification for Contracts, Grants, Loans, And Cooperative Agreements, 40 CFR 34
 - N. American Iron and Steel Contractor's Certification

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BID FORM

ARTICLE 9 - DEFINED TERMS

9.01. The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 10 - BID SUBMITTAL

If Bidder is:

An Individual

Name (typed or printed): _____

By _____
(Individual's Name)

Doing business as: _____

A Partnership

Partnership Name: _____ (SEAL)

By _____
(Signature of general partner--attach evidence of authority to sign)

Name (typed or printed): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

Type (General Business, Professional, Service, Limited Liability): _____

By _____
(Signature--attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Attest: _____ (CORPORATE SEAL)
(Signature of Corporate Secretary)

Date of Qualification to do business in [State where Project is located] is: _____

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BID FORM

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By _____
(Signature of joint venturer partner--attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Second Joint Venturer Name: _____ (SEAL)

By _____
(Signature--attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address _____

Phone No. _____ Fax No. _____

Email _____

SUBMITTED on _____, 20____

State Contractor License No. _____ if applicable.

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BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name and Address of Principal Place of Business*):

OWNER (*Name and Address*):

BID

Bid Due Date:

Description (*Project Name and Include Location*):

BOND

Bond Number:

Date (*Not earlier than Bid due date*):

Penal sum _____ \$ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER**SURETY**

Bidder's Name and Corporate Seal (Seal) Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Above addresses are to be used for giving any required notice. Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

BID SECURITY

(ATTACH BID SECURITY TO THIS PAGE IF CERTIFIED CHECK.)

STATEMENT OF SURETY'S INTENT

(To be completed if Bid Security is to be
Certified or Bank Cashier's Check)

To: _____
(Owner)

We have reviewed the Bid of _____
(Contractor)

of _____
(Address)

for _____

(Project)

Bids for which will be received on _____
(Bid Opening Date)

and wish to advise that should this Bid of the Contractor be accepted and the Contract awarded to him, it is our present intention to become surety on the performance bond and labor and material bond required by the Contract.

Any arrangement for the bonds required by the Contract is a matter between the Contractor and ourselves and we assume no liability to you or third parties if for any reason we do not execute the requisite bonds.

We are duly authorized to do business in the State of _____.

Attest:

Surety's Authorized Signature(s)

Attach Power of Attorney

(Corporate seal if any. If no seal, write "No Seal" across this place and sign.)

(This form must be completed prior to the submission of the bid.)

BIDDER'S QUALIFICATION STATEMENT

To induce the making of this Contract, the Bidder represents to the Owner the following, as evidence of Bidder's Qualifications to perform the work herein specified:

1. How many years has your organization been in business under the name in which you propose to execute this Contract?
____ Years
2. What projects of character similar to that proposed has your present organization completed? Give the information indicated by the following tabulations:

NAME, ADDRESS, AND PHONE NO. OF OWNER FOR WHOM WORK WAS DONE	DESCRIPTION OF WORK	APPROXIMATE AMOUNT OF CONTRACT	APPROXIMATE DATE WORK WAS DONE

3. Has your present organization ever failed to complete any work awarded to it? If so, state when, where and why.

4. Do you have, or can you procure the necessary personnel, equipment, facilities and financial resources to immediately undertake and satisfactorily complete the work contemplated in this Contract?
5. (Other requirements as pertinent)

LIST OF PROPOSED SUBCONTRACTORS

This document is an Attachment to the Bid Form and is a legally binding part thereof;

Each Bidder shall complete this "List of Proposed Subcontractors" in its entirety. Failure to do so shall render the Bid Form non-responsive and be grounds for its rejection by Owner. If Bidder intends to self perform the type of work indicates, write "Self Perform" under Subcontractor Name.

Type of Work	Subcontractor Name & Address	Certified Disadvantage Business Enterprise? or applicable terminology	Subcontract Amount	State Contractor License Number
Mechanical				
Electrical				
Dewatering				
Civil/Site				
Masonry				
Painting				
Roofing				
HVAC				
Plumbing				
Concrete				
Other				

Total Subcontracted Amount: \$ _____

Percent of Total Contract: _____ %

CONTRACTOR'S LICENSE NO.

OR

**EVIDENCE OF BIDDER'S ABILITY TO
OBTAIN STATE CONTRACTOR'S LICENSE**

NON-COLLUSIVE BIDDING CERTIFICATION

Section 103-d of the General Municipal Law requires the following statement subscribed by the bidder as true under the penalties of perjury: Non-Collusive Bidding Certification.

(a) By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in a 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.

Section 103-d of the General Municipal Law, as amended by Chapter 675 L 1966, in addition to requiring the above certification, provides as follows:

(b) A bid shall not be considered for award nor shall any award be made where (1), (2) and (3) above have not been complied with; provided however, that if in 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 (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 made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items or has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of subparagraph one (a).

Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certification referred to in subdivision one of this section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bids and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

Dated: _____, 20____

Signed: _____ Name

_____ Title

_____ Company

_____ Address

Corporate Seal

**PRELIMINARY STATEMENT OF UTILIZATION, MINORITY
AND WOMEN'S (W/MBE) BUSINESS ENTERPRISES**

To: _____
Project No.: _____

In accordance with the goals and conditions of these Contract Documents regarding utilization of MBE/WBE, as set forth as an Exhibit to the Agreement, the undersigned Bidder intends to achieve at least 20 percent of the contract amount through a combination of Minority and Women Business Enterprises participation. These goals will be achieved in the areas of construction and/or purchase as identified below.

If awarded the Contract for this project, the undersigned Bidder will then furnish to the Owner within 10 working days after the date of award, a final MBE/WBE utilization plan. Within 30 days of approval of the Plan, the successful Bidder will submit copies of all subagreements and/or purchase orders relative to the utilization plan.

W/MBE Firm Name and IRS Number	Mailing Address	Type of Service or Materials Furnished	Estimated Dollar Amount
Name _____	Street _____		
	City _____		
IRS No. _____	State _____ Zip Code _____		\$ _____
Name _____	Street _____		
	City _____		
IRS No. _____	State _____ Zip Code _____		\$ _____
Name _____	Street _____		
	City _____		
IRS No. _____	State _____ Zip Code _____		\$ _____
Name _____	Street _____		
	City _____		
IRS No. _____	State _____ Zip Code _____		\$ _____
Name _____	Street _____		
	City _____		
IRS No. _____	State _____ Zip Code _____		\$ _____

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to federally assisted construction contracts and related subcontracts exceeding \$10,000 which are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any federally assisted construction contractor certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certifications in his files.

Signature

Date

Name and Title of Signer (Please Type)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

**AGREEMENT TO ABIDE BY EQUAL EMPLOYMENT OPPORTUNITY
POLICY STATEMENT REQUIREMENTS
NEW YORK STATE REVOLVING FUND (SRF)**

I, _____, am the authorized representative of _____.

Name of Representative

Name of Contractor/Service Provider

I hereby certify that _____ will abide by the equal employment

Name of Contractor/Service Provider

opportunity (EEO) policy statement provisions outlined below.

- (i) A statement that the contractor will not discriminate on the basis of race, creed, color, national origin, sex, age, disability, or marital status against any employee or applicant for employment, will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination and will make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on contracts relating to the Project.
- (ii) An agreement that all of contractor's solicitations or advertisements for employees will state that, in the performance of the contract relating to this Project, all qualified applicants will be afforded equal employment opportunities without discrimination on the basis of race, creed, color, national origin, sex, age, disability or marital status.
- (iii) An agreement to request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the contractor's obligations herein.
- (iv) An agreement to comply with the provisions of the Human Rights Law (Article 15 of the Executive Law), including those relating to non-discrimination on the basis of prior criminal conviction and prior arrest, and with all other State and federal statutory constitutional non-discrimination provisions.

Blank EEO Policy Statements are available at www.efc.ny.gov/mwbe, if needed.

If contractor fails to submit to Recipient an EEO policy statement consistent with the provisions set forth above in clauses (i), (ii), (iii) and (iv) and within the timeframe required thereof, Recipient may declare this contract to be null and void.

X

Contractor/Service Provider Representative

Once completed, please provide to the Prime Contractor and/or the community MBO

Text Left Blank

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Participation Form**

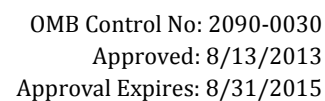
An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services , Equipment or Supplies	Amount Received by Prime Contractor

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.



Please use the space below to report any concerns regarding the above EPA-funded project:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Performance Form

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractors bid or proposal package.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services , Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: ☐ DOT ☐ SBA ☐ Other: _____		Meets/ exceeds EPA certification standards? ☐ YES ☐ NO ☐ Unknown

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity:			

I have identified potential DBE certified subcontractors	___ YES	___ NO	
If yes, please complete the table below. If no, please explain:			
Subcontractor Name/ Company Name	Company Address/ Phone/ Email	Est. Dollar Amt	Currently DBE Certified?

Continue on back if needed

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

**CERTIFICATION
FOR
CONTRACTS, GRANTS, LOANS, AND
COOPERATIVE AGREEMENTS
40 CFR 34**

SRF Project No.: _____

The undersigned each certify, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants, and contracts under grant, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31 U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

By: _____

Name:

Title:

Date: _____

Contract ID: _____

Text Left Blank

To be completed by prime contractors for all construction contracts

AMERICAN IRON AND STEEL (AIS) CONTRACTOR CERTIFICATION
FOR
CONSTRUCTION CONTRACTS PAID FOR WITH FUNDS FROM
THE NYS CLEAN WATER STATE REVOLVING FUND OR
THE NYS DRINKING WATER STATE REVOLVING FUND VIA THE
NYS ENVIRONMENTAL FACILITIES CORPORATION

Project Title: _____

Contractor Name: _____

Contract ID: _____

SRF Project #: _____

SRF Recipient Name: _____

I certify that the iron and steel products that will be permanently incorporated into the public water system or wastewater treatment works project under this construction contract will have been produced in the United States, in accordance with the requirements of the US Environmental Protection Agency. I will also develop and maintain at the project location the necessary documentation to demonstrate that the iron and steel products incorporated into the project were produced in the United States, and make such documentation available to The NYS Environmental Facilities Corporation or their authorized representatives, upon request.

Signature: _____

Name (print): _____

Title: _____

Date: _____

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AGREEMENT

THIS AGREEMENT is by and between the TOWN OF NORTH CASTLE, NY ("Owner") and _____ ("Contractor").

Owner and Contractor, hereby agree as follows:

ARTICLE 1 - WORK

1.01. Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

- A. Construction of an addition onto the existing North Broadway Booster Pump Station.
- B. Installation of a UV disinfection system.
- C. Relocation of the existing chlorine feed system.
- D. Installation and programming of a new pump control panel.
- E. Replacement of the existing emergency generator.
- F. Site rehabilitation and other miscellaneous site work.
- G. Other work as described in the Contract Documents.

ARTICLE 2 - THE PROJECT

2.01. The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows: North Broadway Ultraviolet Disinfection, Town of North Castle, New York.

ARTICLE 3 - ENGINEER

3.01. The Project has been designed by GHD Consulting Services Inc. (Engineer), which is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01. Time of the Essence

- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02. Days to Achieve Substantial Completion and Final Payment

- A. The Work shall be substantially completed within 220 days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, or on or before September 30, 2016, whichever is sooner, and shall be completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions within 250 days after the date when the Contract Times commence to run.

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4.03. Liquidated Damages

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner as follows:
1. \$1,000 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete.
 2. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner \$1,500 for each day that expires after the time specified in Paragraph 4.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.
 3. An additional \$37,500 in damages shall be assessed for each day that expires after September 30, 2016 for the commencement of operation of the UV system and acceptance by the New York State Department of Health until the work is substantially complete, in accordance with the U.S. Environmental Protection Agency Administrative Order on Consent for the Project. Commencement of operation of the UV system shall occur after all startup, functional, and system demonstration testing has been successfully completed in accordance with the Contract Documents.

ARTICLE 5 - CONTRACT PRICE

- 5.01. Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the amounts determined pursuant to the amounts stated in the Schedule of Bid Items in the Contractor's Bid Form. When unit bid price items are included, the quantities of various units contained in the Bid Proposal are estimated and payment shall be made only for the actual quantities of units that are incorporated in the Work, as determined by the Engineer in accordance with paragraph 9.08 of the General Conditions.

ARTICLE 6 - PAYMENT PROCEDURES

6.01. Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02. Progress Payments; Retainage

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the first Wednesday of each month during performance of the Work as provided in the following subparagraph. All such payments will be measured by the Schedule of Values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided in the General Requirements.

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1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions.
 - a. 95% of the Work completed (with the balance being retained) and 95% of the value of undamaged materials and equipment not incorporated in the Work but delivered, suitably stored, and accompanied by documentation satisfactory to Owner in accordance with Paragraph 14.02 of the General Conditions and Supplementary Conditions, less in each case the aggregate of payments previously made, and less such amounts which may be lawfully deducted.
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100% of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 200% of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.03. Final Payment

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07.

ARTICLE 7 - INTEREST (NOT USED)

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

- 8.01. In order to induce Owner to enter into this Agreement, Contractor makes the following representations:
 - A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
 - B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) , if any, that have been identified in Paragraph SC-4.02 of the Supplementary Conditions as containing reliable "technical data", and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph SC-4.06 of the Supplementary Conditions as containing reliable "technical data".
 - E. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings

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identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, or performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; (3) Contractor's safety precautions and programs.

- F. Based on the information and observations referred to in the previous paragraph, Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
- G. Contractor is aware of the general nature of work to be performed by others at the Site that relates to the Work as indicated in the Contract Documents.
- H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01. Contents

- A. The Contract Documents consist of the following:
 - 1. This Agreement (pages 1 to 7, inclusive).
 - 2. General Conditions (pages 1 to 63, inclusive).
 - 3. Supplementary Conditions (pages 1 to 13, inclusive).
 - 4. Specifications as listed in the table of contents of the Project Manual.
 - 5. Drawings consisting of 17 sheets with each sheet bearing the following general title: "North Broadway Ultraviolet Disinfection, Town of North Castle, NY."
 - 6. Addenda (Nos. ____ to ____, inclusive).
 - 7. Exhibits to this Agreement (enumerated as follows):
 - a. Bid Form (pages 1 to 7, inclusive).
 - b. Documentation submitted by Contractor prior to Notice of Award (pages ____ to ____, inclusive).
 - c. Exhibit A – Notice of Award
 - d. Exhibit B – Performance Bond and Payment Bond
 - e. Exhibit C – Certificates of Insurance

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- f. Exhibit D - Identification of Drawings
 - g. Exhibit E – NY State Revolving Fund Programming Requirements Bid Packet for Construction Contracts
 - h. Exhibit F – NY Prevailing Wage Rates and Labor Regulations
 - i. Exhibit G – Federal Wage Rates, Davis-Bacon Act
8. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
- a. Notice to Proceed (pages ____ to ___, inclusive).
 - b. Work Change Directives.
 - c. Change Orders.
- B. There are no Contract Documents other than those listed herein.
- C. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01. Terms

- A. Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions unless specifically identified otherwise herein.

10.02. Assignment of Contract

- A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03. Successors and Assigns

- A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04. Severability

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable

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provision that comes as close as possible to expressing the intention of the stricken provision.

10.05. Contractor's Certifications

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

(continued)

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IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement. Counterparts have been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or have been identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____, 20____, (which is the Effective Date of the Agreement).

Owner _____ Contractor _____

By _____ By _____

Title: _____ Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest _____ Attest _____

Title _____ Title _____

Address for giving notices:

Address for giving notices:

License No. _____
(where applicable)

[If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Owner-Contractor Agreement.]

END OF SECTION

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EXHIBIT A

**NOTICE OF AWARD
NOTICE TO PROCEED**

Notice of Award

Date: _____

Project: _____

Owner: _____

Owner's Contract No.: _____

Contract: _____

Engineer's Project No.: _____

Bidder: _____

Bidder's Address: *[send Notice of Award Certified Mail, Return Receipt Requested]*

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____.

[Indicate total Work, alternates, or sections of Work awarded.]

The Contract Price of your Contract is _____ Dollars \$_____).

[Insert appropriate data if unit prices are used. Change language for cost-plus contracts.]

_____ copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent: _____

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

Owner

By: _____
Authorized Signature

Title

Copy to Engineer

Notice to Proceed

Date: _____

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:
Contractor:	
Contractor's Address: <i>[send Certified Mail, Return Receipt Requested]</i>	

You are notified that the Contract Times under the above Contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____, and the date of readiness for final payment is _____[(or) the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____ *[add other requirements]*.

_____	Owner
_____	Given by:
_____	Authorized Signature
_____	Title
_____	Date

Copy to Engineer

EXHIBIT B

**PERFORMANCE BOND
AND PAYMENT BOND**

PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*): SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.
2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.
3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 3.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
 - 3.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
 - 3.3 Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract; or
 2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.
4. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:
 - 4.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
 - 4.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
 - 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
 2. Deny liability in whole or in part and notify Owner citing reasons therefor.
5. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner

of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

- 6.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
- 6.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
- 6.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

7. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

8. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

- 12.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
- 12.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 12.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 12.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address and Telephone*)

Surety Agency or Broker:

Owner's Representative (*Engineer or other party*):

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
 - 4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - 4.2 Claimants who do not have a direct contract with Contractor:
 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
 3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
 - 6.1 Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 6.2 Pay or arrange for payment of any undisputed amounts.
7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address, and Telephone*)

Surety Agency or Broker:

Owner's Representative (*Engineer or other*):

EXHIBIT C

CERTIFICATES OF INSURANCE

EXHIBIT D

IDENTIFICATION OF DRAWINGS

EXHIBIT D

IDENTIFICATION OF DRAWINGS

The Contract Drawings show the character and scope of the work to be performed and have been prepared or approved by ENGINEER. The Drawings, all of which constitute an integral part of the Contract Documents as approved for construction on the date so designated on said Drawings, carry the ENGINEER's identifying Job No. 8616786 and are listed below by sheet number and title:

CONTRACT NO. 1 – GENERAL

<u>Sheet No.</u>	<u>Title</u>
G001	Cover
G002	Legend, Abbreviations, Symbols, General Notes and List of Drawings
G003	Site Plan – Erosion & Sediment Control – Notes and Details
G004	Miscellaneous Details
G005	Miscellaneous Details
G006	Miscellaneous Details and Building Addition DWV Plan
A001	Modification to Existing Pump Station
A002	Elevation and Details
D001	Demolition and Existing Conditions – Plans, Sections and Photos
M001	Mechanical Plans and Sections – Alternate Layout 1
M002	Mechanical Plans and Sections – Alternate Layout 2
E001	Abbreviations, Symbols, Notes, and Details
E002	One-Line Diagram and Schedules
E003	Schematic Diagram
E004	Electrical Plans
E005	Electrical Plans
I001	SCADA Architecture Diagram & Instrumentation Details

EXHIBIT E

**NEW YORK STATE ENVIRONMENTAL FACILITIES CORPORATION (NYSEFC)
NEW YORK STATE REVOLVING FUND
PROGRAM REQUIREMENTS BID PACKET
CONSTRUCTION CONTRACTS FOR CONTRACTORS**



**Environmental
Facilities Corporation**

NY State Revolving Fund Program Requirements Bid Packet

Construction Contracts For Contractors

Treatment Works Projects
(including CWA Section 212)

Drinking Water SRF

NYS Water Grants Program
(also receiving SRF Loan)

Effective October 1, 2015

**New York State Environmental Facilities Corporation
625 Broadway, Albany, NY 12207-2997
P: (518) 402-6924 F: (518) 402-7456
www.efc.ny.gov**

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Summary of EFC Contractor Requirements

Forms can be found in [Part 3](#) of this document or online at www.efc.ny.gov/MWBE

Forms should be submitted electronically via email or through EFC's [dropbox](#)

* Beginning 10/1/2015 starred forms may be required for disbursement of state revolving loan funds

To be submitted with this bid:

- ☐ *EEO Policy Statement
- ☐ Documented Proof that EPA Form 6100-2 "DBE Subcontractor Participation Form" was given to MWBE Subcontractors
- ☐ *EPA Form 6100-3 "DBE Subcontractor Performance Form"
- ☐ *EPA Form 6100-4 "DBE Subcontractor Utilization Form"
- ☐ *Lobbying Certification
(Certification for Contracts, Grants, Loans, and Cooperative Agreements)
- ☐ *AIS Contractor's Certification

Refer to [Part 2](#):

Guidance Section

[Section 1.B](#)

[Section 2.D](#)

[Section 2.D](#)

[Section 2.D](#)

[Section 3](#)

[Section 4.C](#)

To be submitted after contract award:

- ☐ Executed contracts, subcontracts, agreements, and purchase orders
- ☐ MWBE Utilization Plan and/or Waiver Request
- ☐ EEO Workforce Utilization Report (part of MWBE Monthly Report Form)

[Section 2.D.3](#)

[Section 2.D.1](#)

[Section 1.C](#)

Tasks for construction start:

- ☐ Ensure that all subcontracts contain [Part 1: Required Language](#)
- ☐ Post EEO Poster
- ☐ *Pay the higher of prevailing federal, state, or local wages including benefits (applies to Primes and Subcontractors)
- ☐ Post Davis Bacon Wage Poster AND Wage Rates
- ☐ Use Federal Payroll Form (WH-347)
- ☐ Obtain apprentice and trainee certifications
- ☐ Obtain AIS Manufacturer's Certifications for all iron & steel products

[Section 5.D.7](#)

[Section 1.D](#)

[Section 5.D.4](#)

[Section 5.D.1](#)

[Section 5.D.3](#)

[Section 5.D.8](#)

[Section 4.B](#)

Ongoing documentation & tasks:

- ☐ Submit Monthly MWBE Reports to MBO
- ☐ Maintain weekly certified payrolls for all Prime & Subcontractors
- ☐ Maintain proof of payments for MWBE Subcontractors
- ☐ Maintain AIS Manufacturer's Certifications

[Section 2.D.4](#)

[Section 5.D.3](#)

[Section 2.D.4](#)

[Section 4.B](#)

Other documents to be submitted by SRF recipient:

- ☐ *Certified Bid Advertisement
- ☐ *Bid Tabulation
- ☐ *Notice of Award
- ☐ *Notice to Proceed
- ☐ *Conformed Set of Contract Documents

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BID PACKET FOR CONSTRUCTION CONTRACTS

NEW YORK CLEAN WATER and DRINKING WATER STATE REVOLVING FUNDS

Administered by the New York State Environmental Facilities Corporation (EFC)

Contents of Bid Packet

Part 1: REQUIRED CONTRACT LANGUAGE

The required contract language to be inserted into all contracts and subcontracts to satisfy State Revolving Fund (SRF) Program requirements.

Part 2: GUIDANCE MATERIALS

A description of the program requirements as they relate to contracts and subcontracts funded in whole or in part by the New York State Revolving Funds.

Part 3: REQUIRED FORMS

Copies of required forms are included at the end of this packet for the Contractor's use. All forms can be found on the EFC website (www.efc.ny.gov/MWBE).

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PART 1:

REQUIRED CONTRACT LANGUAGE

This Part 1 is to be inserted in its entirety for ALL project contracts and subcontracts being funded in whole or in part with SRF funds.

Check EFC's website (www.efc.ny.gov/MWBE) for updates.

****Please note that the contractual language in its entirety is not necessarily applicable to all projects. Information is provided in parentheses below each program section within to identify circumstances when certain language is not applicable.****

Part 1: Table of Contents

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REQUIRED TERMS FOR PROJECT CONTRACTS AND SUBCONTRACTS

*** (This section applies to all contracts and subcontracts) ***

In accordance with the terms and conditions set forth in Section 5.1 of the Project Finance Agreement, Recipient agrees that the following language will be included in all contracts and subcontracts regarding the Project including but not limited to those relating to construction, engineering, architectural, legal and fiscal services, as required by federal and state laws, regulations, and executive orders applicable to this Project:

Defined Terms:

The term “Bid Packets” means the New York State Revolving Fund (SRF) Bid Packet for Construction Contracts and Bid Packet for Non-Construction Contracts and Service Providers, available at www.efc.ny.gov/MWBE.

The term “Contractor”, as used in this contract or subcontract, means, and applies to, all Prime Contractors, consultants and Service Providers as hereinafter defined, unless specifically referred to otherwise.

The term “Service Providers” means those who provide the following: legal, engineering, financial advisory, technical, or other professional services, supplies, commodities, equipment, materials, and travel.

The term “Subcontractor”, as used in this contract or subcontract, means, and applies to, any individual or business enterprise that has an agreement, purchase order, or any other contractual arrangement with a Contractor.

The term “EEO policy statement” means a statement of the Contractor and Subcontractor setting forth at least the following:

- (i) A statement that the Contractor will provide for and promote equal employment opportunity free of discrimination and harassment against any person on the basis of race, color, national origin, age, disability, sex, gender, sexual orientation, religion, genetic characteristics or information, status as a victim of domestic violence, veteran or military status, marital or family status, or any other discrimination prohibited by law, and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination and will make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on contracts relating to the Project.
- (ii) An agreement that all of Contractor’s solicitations or advertisements for employees will state that, in the performance of the contract relating to this Project, all qualified applicants will be provided with equal employment opportunity free of discrimination and harassment against any person on the basis of race, color, national origin, age, disability, sex, gender, sexual orientation, religion, genetic characteristics or information, status as a victim of domestic violence, veteran or military status, marital or family status, or any other discrimination prohibited by law.
- (iii) An agreement to request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate or harass on the basis of race, color, national origin, age, disability, sex, gender, sexual orientation, religion, genetic characteristics or information, status as a victim of domestic violence, veteran or military status, marital or family status, or any other discrimination prohibited by law and that such union or representative will affirmatively cooperate in the implementation of the Contractor’s obligations herein.
- (iv) An agreement to comply with the provisions of the Human Rights Law (Article 15 of the Executive Law), including those relating to non-discrimination on the basis of prior criminal conviction and prior arrest, and with all other State and federal statutory constitutional non-discrimination provisions.

The term “EFC” means the New York State Environmental Facilities Corporation.

The term “EPA” means the United States Environmental Protection Agency.

The term “ESD” means the Empire State Development Corporation - Division of Minority and Women’s Business Development.

The term “Recipient” means the party, other than EFC, to a grant agreement or a project finance agreement with EFC through which funds for the payment of amounts due hereunder are being paid in whole or in part.

The term “Service Providers” means professional services, such as legal, engineering, financial advisory or other professional services, supplies, commodities, equipment, materials, and travel.

The term “State” means the State of New York.

The term “Treatment Works” is defined in Clean Water Act (CWA) Section 212. Examples include new, expanded or rehabilitated wastewater; sludge treatment and disposal facilities including biosolids reuse; collector, trunk and interceptor sewers; sewer rehabilitation and infiltration/inflow correction; municipally-owned sewers and treatment capacity for industrial wastewater; combined sewer overflow (CSO) abatement; stormwater resiliency and pollution abatement; energy initiatives, including energy efficiency and on-site power generation for treatment plants and sewer systems; water treatment plant filter backwash and sludge treatment; water efficiency projects, including conservation and reuse of water; septage hauling and marine vessel pump out/treatment facilities; publically-owned water conservation/reuse devices or systems; and security measures for wastewater treatment plants and sewer systems. Stormwater management facilities that are specifically required by a Long Term Control Plan, administrative/judicial order, or a SPDES permit for an MS4 or combined sewer system are considered to be Section 212 projects.

The terms “Nonpoint Source Projects” and “Green Infrastructure Project” are defined in CWA Section 319. Examples include green infrastructure projects that manage stormwater, such as constructed wetlands, biofilters, porous pavement and green roofs; waterbody restoration including stream bank stabilization and drainage erosion and sediment control; restoration of riparian vegetation, wetlands and other water bodies; land acquisition or conservation easements for water quality protection; stormwater management facilities, such as street sweepers and catch basin vacuum vehicles, sediment traps and basins; and capping and closure of municipal solid waste landfills, landfill reclamation, landfill leachate collection, storage and treatment of landfill gas collection and control systems.

The term “Estuary Management Program Project” means a CWA Section 320 Project. Examples include projects necessary to implement the EPA-approved Estuary Conservation and Management Plans for the New York-New Jersey Harbor; Peconic Bay; and Long Island Sound Estuaries.

EEO AND MWBE LANGUAGE, GOALS AND OTHER PROGRAM REQUIREMENTS

*** (Applies to all contracts) ***

Interpretation:

This contract is subject to Article 15-A of the Executive Law (Article 15-A) and 5 NYCRR 140-145 (the Regulations) and shall be considered a State Contract as defined therein. If any of the terms herein conflict with Article 15-A or the Regulations, such law and regulations shall supersede these requirements.

Representations and Acknowledgements of Contractor and Subcontractor:

The Contractor acknowledges that funds for the payment of amounts due under this contract are being provided in whole or in part subject to the terms and conditions of a grant agreement or a project finance agreement with EFC.

The Contractor represents that it has submitted an EEO policy statement and an MWBE Utilization Plan (Prime Contractors only) to the Recipient, **prior to the execution of this contract.**

Suspension/Debarment - The Contractor is not a debarred or suspended party under 2 CFR Part 180, 2 CFR Part 1532 and 40 CFR Part 32. Further, neither the Contractor nor any of its Subcontractors have contracted with, or will contract with, any debarred or suspended party under the foregoing regulations or with any party that has been determined to be ineligible to bid under Section 316 of the Executive Law.

Equal Employment Opportunity (EEO), Affirmative Action, MWBE and Other Covenants:

Contractor and Subcontractor shall comply with all federal and state laws, regulations, and executive orders applicable to this Project, and shall provide such documentation, including periodic reports, as may be requested from time to time and as set forth in guidance documentation available at www.efc.ny.gov/MWBE, including but not limited to the Bid Packets.

With respect to this contract, the Contractor and Subcontractor shall undertake or continue existing programs of affirmative action and equal employment opportunity to ensure that minority group members and women are afforded equal employment opportunities without discrimination because of race, color, national origin (including limited English proficiency), age, disability, sex, gender, sexual orientation, religion, genetic characteristics or information, status as a victim of domestic violence, veteran or military status, marital or family status, or any other discrimination prohibited by law. For these purposes, affirmative action shall apply in the areas of recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff, or termination and rates of pay or other forms of compensation.

MWBE PROGRAM

NEW Goals as of 10/1/2015

*** (Applies to all: (1) Construction contracts greater than \$100,000
(2) Contracts that are initially under this threshold but subsequent change orders or contract amendments increase the contract value above \$100,000
(3) Change orders greater than \$25,000) ***

MWBE Goals - The Contractor agrees to pursue MWBE goals in effect at the time of execution of this contract. The MWBE goals shall be applied to the total amount being funded pursuant to the grant agreement or project finance agreement with EFC. Please contact EFC if you have any questions about the applicable goals for your contract.

Program	MWBE Combined Goal*
CWSRF, DWSRF, & GIGP	20%
NYS Water Grants (also receiving SRF loan)	CWSRF 23% DWSRF 26%
Engineering Planning Grant	CFA Round 2012-2014 20% CFA Round 2015-2016 30%

*May be any combination of MBE and/or WBE participation

Contractors shall solicit participation of MWBE Contractors (including Subcontractors, consultants and Service Providers) for SRF-funded projects in accordance with the aforementioned goals. The Contractor must submit sufficient documentation to demonstrate good faith efforts to provide opportunities for MWBE participation for work related to the SRF-funded project in the event respective goals are not achieved. Guidance pertaining to documentation of good faith efforts is set forth in the Bid Packet.

The Contractor agrees that for purposes of providing meaningful participation by MWBEs on the contract and achieving the goals, Contractor will reference the directory of New York State Certified MWBEs found at the following internet address: ny.newnycontracts.com.

Subcontractors who in turn subcontract work shall also comply with MWBE requirements for that contract.

MWBE Utilization Plan (MWBE Utilization Plan requirements apply to Contractors. MWBE Utilization Plans are submitted to the SRF Recipient's minority business officer (MBO) prior to execution of a contract.) Each Contractor shall prepare an MWBE Utilization Plan, and any subsequent revisions or amendments thereto, that provides information describing MBEs and WBEs to be utilized at various times during the performance of

this contract. The MWBE Utilization Plan shall identify the Contractor's proposed MBE and WBE utilization for this contract and the MWBE participation goals established for this contract by EFC. The MBEs and WBEs identified in the MWBE Utilization Plan must be certified by, or have applied for, certification from ESD.

In the event that the Contractor's approved MWBE Utilization Plan does not propose achievement of the MWBE participation goals for this contract, the Contractor shall complete a waiver request as hereinafter referenced.

Submission – Within 30 days of execution of this contract, the Contractor shall submit to the Recipient copies of all signed subcontracts, agreements, and/or purchase orders referred to in the MWBE Utilization Plan.

Compliance – The Contractor agrees to adhere to its approved MWBE Utilization Plan for the participation of MWBEs on this contract pursuant to their respective MWBE goals.

Waivers – If the Contractor's application of good faith efforts does not result in the utilization of MBE and/or WBE firms to achieve the aforementioned goals then, prior to execution of a contract, the Contractor shall complete the waiver request portion of the MWBE Utilization Plan and submit it to the Recipient. The Contractor is entitled to receive a written notice of acceptance or denial within 20 days of receipt. Upon receipt of a notice of deficiency from the Recipient, the Contractor shall respond with a written remedy to such notice within 7 days. Such response may include a request for a total or partial waiver of the aforementioned goals.

The Contractor shall comply with the requirements set forth in the Bid Packets regarding waivers.

Required Reports – MWBE Monthly Report – The Contractor agrees to submit a report to the Recipient by the 3rd business day following the end of each month over the term of this contract documenting the payments made and the progress towards achievement of the MWBE goals of this contract.

EEO PROGRAM

*** (Applies to all contracts and subcontracts greater than \$10,000) ***

Required Reports - EEO Workforce Utilization Reports

During the term of this contract, the Contractor and Subcontractor shall submit to the Recipient EEO Workforce Utilization Reports. Contractor and Subcontractor shall submit this information on a monthly basis to report the actual labor hours utilized in the performance of this contract by the specified categories listed including ethnic background, gender, and Federal occupational categories. The EEO Workforce Utilization Report must be submitted to report this information.

All EEO Workforce Utilization Reports submitted by the Contractor and Subcontractor shall reflect a separation of the workforce utilized in the performance of this contract from Contractor or Subcontractor's total workforce. The Contractor shall submit the EEO Workforce Utilization Report and indicate that the information provided relates to the actual workforce utilized on this contract. If the Contractor or Subcontractor fails to separate the workforce to be utilized on this contract from the total workforce, as determined by Recipient, the Contractor shall submit the EEO Workforce Utilization Report and indicate that the information provided is the Contractor or Subcontractor's total workforce during the subject time frame, not limited to work specifically under this contract.

DISADVANTAGED BUSINESS ENTERPRISES

*** (Applies to all contracts and subcontracts) ***

The Contractor and Subcontractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The Contractor and Subcontractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the Contractor and Subcontractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

Contractors and Subcontractors shall comply with the requirements set forth in the Bid Packets regarding Disadvantaged Business Enterprises.

REMEDIES

Applies to all contracts

Upon a determination by the Recipient of the Contractor's non-responsiveness, non-responsibility or breach as a result of a failure to comply with the requirements of Article 15-A and the Regulations, the Recipient may withhold funds under this contract or take such other actions, impose liquidated damages or commence enforcement proceedings as set forth herein or as otherwise allowed by law or in equity.

If the Contractor or Subcontractor fails to submit to Recipient an EEO policy statement consistent with the provisions set forth in clauses (i), (ii), (iii) and (iv) of the definition thereof and within the timeframe required therefor, Recipient may declare this contract to be null and void.

The Contractor and Subcontractor agree that a failure to submit and/or adhere to its EEO policy statement, EEO Workforce Staffing Plan for Service Provider (Non-construction) Contracts (if applicable), and an MWBE Utilization Plan (Contractors only), and any other required periodic reports, shall constitute a material breach of the terms of this contract, entitling Recipient to any remedy provided herein, including but not limited to, a finding of Contractor non-responsiveness.

Liquidated or Other Damages - If it has been determined by the Recipient or NYSEFC that the Contractor is not in compliance with the requirements herein or refuses to comply with such requirements, or if the Contractor is found to have willfully and intentionally failed to comply with the MWBE participation goals, the Contractor shall be obligated to pay to Recipient liquidated damages or other appropriate damages, as determined by the Recipient or EFC, in accordance with Section 316-a of Article 15-A and 5 NYCRR §142.13.

Liquidated damages shall be calculated as an amount not to exceed the difference between:

1. All sums identified for payment to MWBEs had the Contractor achieved the contractual MWBE goals; and
2. All sums actually paid to MWBEs for work performed or materials supplied under this contract.

In the event a determination has been made by the Recipient or EFC which requires the payment of liquidated damages and such identified sums have not been withheld, Contractor shall pay such liquidated damages to the Recipient within sixty (60) days after they are assessed unless prior to the expiration of such sixtieth day, the Contractor has filed a complaint with ESD pursuant to Subdivision 8 of Section 313 of the Executive Law in which event the liquidated damages shall be payable if the Director of ESD renders a decision in favor of the Recipient.

RESTRICTIONS ON LOBBYING

Applies to all contracts and subcontracts greater than \$100,000

The Contractor and Subcontractor executing a contract in excess of \$100,000 agree to provide to the Recipient an executed Certification For contracts, Grants, Loans, and Cooperative Agreements 40 CFR 34, in the form attached hereto, consistent with the requirements of 40 CFR Part 34.

DAVIS-BACON (DB) PREVAILING WAGE REQUIREMENTS

****Applies to all: (1) Construction contracts and subcontracts greater than \$2,000
(2) CWSRF Treatment Works Projects – see Defined Terms
(3) DWSRF projects)****

The Recipient acknowledges and hereby agrees to comply with the Wage Rate Requirements under the Davis-Bacon Act, which are hereby restated in pertinent part as follows:

Preamble

The Clean Water Act (CWA) and Safe Drinking Water Act (SDWA) require that all laborers and mechanics employed by Contractors and Subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government pursuant to the SRF shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code.

Pursuant to Reorganization Plan No. 14 and the Copeland Act, 40 U.S.C. 3145, the Department of Labor has issued regulations at 29 CFR Parts 1, 3, and 5 to implement the Davis-Bacon (DB) and related Acts. Regulations in 29 CFR 5.5 instruct agencies concerning application of the standard DB contract clauses set forth in that section. Federal agencies providing grants, cooperative agreements, and loans under the SRF shall ensure that the standard DB contract clauses found in 29 CFR 5.5(a) are incorporated in any resultant covered contracts that are in excess of \$2,000 for construction, alteration or repair (including painting and decorating).

With respect to the Clean Water and Safe Drinking Water State revolving Funds, EPA provides capitalization grants to the State which in turn, through EFC, provides subgrants or loans to eligible entities within the State (Recipient(s)). Typically, the Recipients are municipal or other local governmental entities. For these types of Recipients, the provisions set forth under Roman Numeral I, below, shall apply. Although EPA and the State remain responsible for ensuring Recipients' compliance with the wage rate requirements set forth herein, those Recipients shall have the primary responsibility to maintain payroll records as described in Section 3(ii)(A), below and for compliance as described in Section I-5.

Requirements under the Davis-Bacon Act for Recipients

The following terms and conditions specify how the New York State Environmental Facilities Corporation (EFC) and governmental Recipients will meet the DB requirements. If a Recipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact EFC. EFC or Recipient may also obtain additional guidance from the web site of the Department of Labor (DOL) at <http://www.dol.gov/whd/programs/dbra/>.

1. Applicability of the Davis-Bacon (DB) prevailing wage requirements.

Davis-Bacon prevailing wage requirements apply to the construction, alteration, and repair activity of infrastructure, including all construction, alteration and repair activity involving waste water or drinking water treatment plants as subject to DB. If a Recipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the Recipient must discuss the situation with EFC before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Recipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that Subcontractors follow the wage determination incorporated into the Prime contract.

(i) While the solicitation remains open, the Recipient shall monitor www.wdol.gov on a weekly basis

to ensure that the wage determination contained in the solicitation remains current. The Recipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the Recipients may request a finding from EFC that there is not a reasonable time to notify interested Contractors of the modification of the wage determination. EFC will provide a report of its findings to the Recipient.

- (ii) If the Recipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless EFC, at the request of the Recipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The Recipient shall monitor www.wdol.gov/ on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.
- (b) If the Recipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing Contractor (ordering instrument) rather than by publishing a solicitation, the Recipient shall insert the appropriate DOL wage determination from www.wdol.gov/ into the ordering instrument.
- (c) Recipient shall review all subcontracts subject to DB entered into by Prime Contractors to verify that the Prime Contractor has required its Subcontractors to include the applicable wage determinations.
- (d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a Recipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the Recipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the Recipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The Recipient's Contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

- (a) The Recipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1, the following clauses:

(1) Minimum wages

- (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly

period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its Subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Recipients may obtain wage determinations from the U.S. Department of Labor's web site, www.wdol.gov.

- (ii)(A) The Recipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The EPA award official shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (2) The classification is utilized in the area by the construction industry; and
 - (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Recipient(s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.
- (C) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the Recipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the questions, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor

shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

- (iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding

The Recipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any Subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records

- (i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
- (ii)(A) The Contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the Recipient, that is, the entity that receives the sub-grant or loan from EFC. Such documentation shall be available on request of EFC or EPA. As to each payroll copy received, the Recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of

the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at www.dol.gov/whd/programs/dbra/wh347.htm or its successor site. The Prime Contractor is responsible for the submission of copies of payrolls by all Subcontractors. Contractors and Subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Recipient(s) for transmission to the State or EPA if requested by EPA, the State, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a Prime Contractor to require a Subcontractor to provide addresses and social security numbers to the Prime Contractor for its own records, without weekly submission to the Recipient(s).

- (B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or Subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
 - (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
 - (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.
- (D) The falsification of any of the above certifications may subject the Contractor or Subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- (iii) The Contractor or Subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or Subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees

- (i) **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and

Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or Subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (iii) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements

of Executive Order 11246, as amended, and 29 CFR part 30.

- (5) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- (6) Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for the compliance by any Subcontractor or lower tier Subcontractor with all the contract clauses in 29 CFR 5.5.
- (7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a Contractor and a Subcontractor as provided in 29 CFR 5.12.
- (8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its Subcontractors) and Recipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.
- (10) Certification of eligibility.
 - (i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. Contract Provision for Contracts in Excess of \$100,000.

(a) Contract Work Hours and Safety Standards Act. The Recipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

- (1) Overtime requirements. No Contractor or Subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the Contractor and any Subcontractor responsible

therefore shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

- (3) Withholding for unpaid wages and liquidated damages. The Recipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or Subcontractor under any such contract or any other Federal contract with the same Prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same Prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.
- (4) Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any Subcontractor or lower tier Subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.
- (b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Recipient shall insert a clause requiring that the Contractor or Subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Recipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the Contractor or Subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the Contractor or Subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

- (a) The Recipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that Contractors or Subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The Recipient must use Standard Form 1445 or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.
- (b) The Recipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by Contractors or Subcontractors and the duration of the contract or subcontract. Recipients must increase the frequency of the interviews if the initial interviews or other information indicates that there is a risk that the Contractor or Subcontractor is not complying with DB. Recipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.
- (c) The Recipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that Contractors or Subcontractors are paying the appropriate wage rates. The Recipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by Contractors or Subcontractors and the duration of the contract or subcontract. At a minimum, the Recipient must spot check payroll data within two weeks of each Contractor or

Subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Recipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the Contractor or Subcontractor is not complying with DB. In addition, during the examinations the Recipient shall verify evidence of fringe benefit plans and payments thereunder by Contractors and Subcontractors who claim credit for fringe benefit contributions.

- (d) The Recipient shall periodically review Contractors' and Subcontractors' use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and Subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.
- (e) Recipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at www.wdol.gov.

AMERICAN IRON AND STEEL (AIS) REQUIREMENT

*** (Applies to all contracts and subcontracts for:*

- (1) CWSRF Treatment Works Projects – see Defined Terms*
- (2) all DWSRF projects)***

The Contractor acknowledges to and for the benefit of the Recipient of the Clean Water State Revolving Fund (CWSRF) or the Drinking Water State Revolving Fund (DWSRF) financial assistance that the Contractor understands the goods and services under this Agreement are being funded with monies made available by the New York State Environmental Facilities Corporation (EFC) through the CWSRF or the DWSRF and that such funding is subject to certain statutory restrictions requiring that certain iron and steel products used in the project be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contractor pursuant to this Agreement.

The Contractor hereby represents and warrants that:

- (a) the Contractor has reviewed and understands the American Iron and Steel Requirement,
- (b) all of the iron and steel products covered by the American Iron and Steel Requirement used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and
- (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Recipient.

Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Recipient to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Recipient resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the EFC or any damages owed to the EFC by the Recipient). While the Contractor has no direct contractual privity with the EFC, as a lender to the Recipient for the funding of this project, the Recipient and the Contractor agree that the EFC is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the EFC.

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PART 2:

GUIDANCE MATERIALS

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INTRODUCTION

A description of requirements as they relate to contracts funded in whole or in part by the New York State Revolving Funds:

Applicability:

This guidance applies to construction contracts entered into between an SRF recipient (Recipient) and a contractor (or between a Contractor and Subcontractor) when SRF funds are expended for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereof.

Purpose of Documents:

This guidance is designed to complement the required contract language as set forth in Part 1, by providing additional information intended to assist SRF Recipients and bidders in complying with EEO, MWBE and other requirements of the SRF programs, as appropriate, including:

- New York State Executive Law, Article 15-A and New York Code of Rules and Regulations, Title 5 (5 NYCRR) Parts 140-145 (Regulations of the Commissioner of Economic Development)
- 40 Code of Federal Regulations (CFR) Part 33 – “Participation by Disadvantaged Business Enterprises in US EPA Programs”
- Restrictions on Lobbying
- P.L. 113-76, Consolidated Appropriates Act, 2014; WRRDA Section 608 of the Federal Water Pollution Control Act, as revised – “American Iron and Steel” (AIS)
- Davis Bacon Related Acts (DBRA) consisting of the following:
The Davis Bacon Act; Copeland Act 40 U.S.C. 3145; Reorganization Plan No. 14;
Department of Labor 29 CFR Parts 1, 3, and 5; Contract Work Hours and Safety Standards Act

Contractors are required to engage in oversight practices that ensure that the wages paid to employees and Subcontractors are consistent with DBRA requirements including payment of the higher of the state or federal wages.

Contractors are required to engage in procurement practices that will provide opportunities for meaningful participation of minority and women-owned business enterprises (MWBE) in providing construction, labor, travel, equipment, materials, supplies, services (including legal, financial, engineering or other professional services), or any combination of the above, and practices to encourage the employment of minorities and women in the workforce.

Failure to report on EEO participation or to meet any of the program requirements and regulations described within this packet in a timely manner may result in withholding of disbursements of SRF funds or other remedies as reflected in the SRF financial assistance agreement. This may affect the Contractor's payments.

Contractor are required to use iron and steel products made in the United States for the construction, alteration, maintenance, or repair of a public water system or treatment works.

Reference the EFC website to ensure the most recent forms and language. (www.efc.ny.gov/MWBE)

The New York State Environmental Facilities Corporation (EFC) implements the New York State Revolving Fund (SRF) for both Clean Water and Drinking Water projects. This guidance outlines the activities that must be performed by each Contractor and Subcontractor on an SRF funded project in order to comply with federal and New York State laws and regulations.

SECTION 1 EQUAL EMPLOYMENT OPPORTUNITY

*** (Applies to all contracts and subcontracts greater than \$10,000) ***

A. WORKFORCE DIVERSITY

Contractors are required to document their efforts to meet EEO goals for the employment of minorities and women on all SRF funded projects on the EEO Workforce Utilization Report. The United States Department of Labor (DOL) has established EEO goals for employment of minority and women. The goals are available on EFC's website in the Prime Contractor folder.

B. EEO POLICY STATEMENT

The EEO Policy Statement is documentation of a Contractor's or Subcontractor's policy of non-discrimination in accordance with federal and state laws. EEO Policy Statements must: be submitted to the Recipient's minority business officer (MBO) as part of any bid proposal or upon execution of a subcontract; include language as defined above (see Required Terms for Project Contracts and Subcontracts – EEO Policy Statement definition); and be signed by the Contractor or Subcontractor, as applicable.

The EEO Policy Statement can be found in the Required Forms section of this document and on EFC's website in both the Prime Contractor and MWBE Subcontractor sections.

C. EEO WORKFORCE UTILIZATION REPORTS

Upon the execution of the contract and monthly thereafter, the Contractor shall submit to the Recipient's MBO an EEO Workforce Utilization Report that documents the actual labor hours worked by ALL Contractor AND Subcontractor employees during the prior month period, on activities related to the contract, broken down by specific ethnic background, gender, and Federal occupational categories or other appropriate categories specified by the Recipient.

The *EEO Workforce Utilization Report* is part of the MWBE Monthly Report form. Both the EEO Workforce Utilization Report and MWBE Monthly Report are found on the EFC website in the Prime Contractor folder.

All EEO Workforce Utilization Reports submitted by the Contractor and Subcontractor must reflect a separation of the workforce utilized in the performance of this contract from Contractor or Subcontractor's total workforce. The EEO Workforce Utilization Report must indicate that the information provided relates to the actual workforce utilized. If the Contractor or Subcontractor fails to separate the workforce to be utilized on this contract from the total workforce as determined by Recipient, Contractor shall submit the EEO Workforce Utilization Report and indicate that the information provided is Contractor or Subcontractor's total workforce during the subject time frame, not limited to work specifically under a particular contract.

D. OTHER CONSTRUCTION CONTRACTOR RESPONSIBILITIES

1. Display the EEO poster at the project site in a visible location. The EEO poster is found at <http://www.dol.gov/oasam/programs/osdbu/sbrefa/poster/matrix.htm>.
2. Make all EEO documents and records available upon request to EFC staff, MBO, or their authorized representatives.
3. Provide programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination on the basis of race, color, national origin (including limited English proficiency), age, disability, sex, gender, sexual orientation, religion, genetic characteristics or information, status as a victim of domestic violence, veteran or military status, marital or family status, or any other discrimination prohibited by law.

SECTION 2 MWBE and DBE

******(DBE Applies to all contracts

MWBE Applies to all: (1) Construction contracts greater than \$100,000
(2) Projects that are initially under these thresholds but have subsequent change orders that increase the contract value above \$100,000
(3) Change orders greater than \$25,000)**

A. MWBE REQUIREMENTS

Recipients, Contractors and Subcontractors must comply with New York State Executive Law, Article 15-A and New York Code of Rules and Regulations, Title 5 (5 NYCRR) Parts 140-145 (Regulations of the Commissioner of Economic Development).

Construction contracts, for the purposes of SRF MWBE compliance, are written agreements between an SRF Recipient and a Contractor (or Subcontractor) whereby the SRF Recipient commits to expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvements thereof in support of an SRF financed project.

Amendments or change orders for such construction contracts with a value greater than \$25,000 may be subject to MWBE requirements as well. The Prime Contractor is to seek additional MWBE participation for the additional value of the contract unless EFC determines otherwise.

If contracts with a value of \$100,000 or less have subsequent change orders or amendments that bring the total contract value to greater than \$100,000, the full value of the contract will then be subject to MWBE requirements.

B. MWBE PARTICIPATION GOALS (FAIR SHARE OBJECTIVES)

NEW GOALS AS OF 10/1/2015

Based on the report, "The State of Minority and Women-Owned Business Enterprise: Evidence of New York, April 29, 2010" (NYS Disparity Study), there is a demonstrated availability of MWBEs throughout New York State. Contractors are required to solicit participation of MWBE firms (including Subcontractors, consultants, and Service Providers) for SRF funded projects.

MWBE participation goals will be based on the goals in place at the time of the execution date of each respective contract, unless MWBE participation goals have been otherwise specified in an executed SRF grant agreement or project finance agreement. The current goals for this program are listed below. If your contract was executed prior to October 1, 2012 please speak to an EFC Representative to determine what goals apply.

Program	MWBE Combined Goal*
CWSRF, DWSRF, & GIGP	20%
NYS Water Grants (also receiving SRF loan)	CWSRF 23% DWSRF 26%
Engineering Planning Grant	CFA Round 2012-2014 20% CFA Round 2015-2016 30%

*May be any combination of MBE and/or WBE participation

C. RECEIVING CREDIT UNDER THE EFC MWBE PROGRAM

To receive MWBE participation credit, Contractors or Subcontractors performing work that have been identified in an approved MWBE Utilization Plan (See Subsection D1 below for more information) must be certified as an MBE or WBE by the Division of Minority and Women's Business Development, Empire State Development Corporation (ESDC). Conditional credit will be given for firms that have applications pending with ESDC.

Prime Contractors that are certified MWBE will receive credit for MWBE participation. Primes may include second tier Subcontractors (Subcontractors hired by Subcontractors) on their MWBE Utilization Plan.

A list of firms certified in New York State can be found on the ESD website at <https://ny.newnycontracts.com>. Searches can be performed by the business name, commodity code or business description.

D. CONTRACTOR’S MWBE RESPONSIBILITIES

At the Time of Bid:

The completed forms listed below shall be part of the official bid submission (including proposals) by each competing Contractor:

- **EPA Form 6100-3 “DBE Subcontractor Performance Form”**

This form shall be completed by all potential Subcontractors and collected by the bidder to be included as part of the bid submission.

- **EPA Form 6100-4 “DBE Subcontractor Utilization Form”**

This form shall be completed by each potential bidder and submitted as part of the bid submission. On this form, each bidder offers their estimated plan for MBE and WBE utilization for their contract.

NOTE: The Prime **Contractor**’s EEO Policy Statement should be completed and included as part of the bid submission.

Prior to Award of the Contract:

- **EPA Form 6100-2 “DBE Subcontractor Participation Form”**

Distribute the form to MWBE Subcontractors who are listed on the 6100-4 form. Submit to the MBO documented proof (e.g. email, letter, certified mail receipt) to the MBO that the 6100-2 form was made available to the MWBE Subcontractors. (See [Part 3: Required Forms](#))

After Award of the Contract:

Each Prime Contractor is obligated to seek MWBE participation and document their good faith efforts to meet MWBE goals.

1. MWBE Utilization Plan (UP)

a. **Due Date:** MWBE UPs are required to be submitted to the MBO no later than the date of execution of the contract.

b. **Preparation:** Each Contractor shall prepare an MWBE UP that provides information describing MBEs and WBEs to be utilized during the term of the contract. The MWBE UP will reflect the EFC MWBE goals that apply to the contract as well as the Contractor’s anticipated MWBE participation. The Prime **Contractor** may take credit for certified firms obtained by their Subcontractors. The Contractor will transmit the completed MWBE UP form, with all pages filled out, to the MBO. Blank MWBE UP forms are available on EFC’s MWBE website.

MWBE UP revisions should be submitted to the MBO, with the next monthly report. When an MWBE UP is revised due to execution of a change order, the change order should be submitted to the MBO with the revised MWBE UP.

- c. **NYS Certified:** The MBEs and WBEs identified in the MWBE UP must be certified by, or have applied for certification from:

Empire State Development Corporation
 Division of Minority and Women's Business Development
 625 Broadway
 Albany, New York 12245
 Phone: 1-800-782-8639
www.esd.ny.gov/MWBE.html

- d. **Supplier Credit:** Credit for MBE/WBE participation shall be granted for MWBE firms performing a commercially useful business function according to custom and practice in the industry.

"Commercially useful functions" normally include:

- i. Providing technical assistance to a purchaser prior to a purchase, during installation, and after the supplies or equipment are placed in service;
- ii. Manufacturing or being the first tier below the manufacturer of supplies or equipment; or
- iii. Providing functions other than merely accepting and referring requests for supplies or equipment to another party for direct shipment to a Contractor.
- iv. Being responsible for ordering, negotiating price, and determining quality and quantity of materials and supplies.

MBE/WBE goal crediting:

- i. For MWBE suppliers who are manufacturers, fabricators, or official manufacturer's representatives who are warehousing such goods, up to 100% of the MBE/WBE objective may be credited.
- ii. No credit will be granted for MBEs and/or WBEs that do not provide a commercially useful function.

- e. **Waiver Request:** If the Contractor's application of good faith efforts does not result in the utilization of MBE and/or WBE firms to achieve the aforementioned goals or a specialty equipment/service waiver is requested, the Contractor shall complete the waiver request portion of the MWBE UP, attach appropriate documentation, and submit it to the MBO. **See Section F for more information.**

- f. **MWBE Utilization Plan Acceptance vs. Notice of Deficiency:** The MBO will evaluate a completed MWBE UP. If the MBO finds the UP sufficient, after review and application of the requirements set forth in this guidance, they will forward to EFC for review. If the MBO finds the UP insufficient, they will work with the Contractor to address deficiencies before submitting to EFC for review. A written notice of acceptance or denial will be issued by EFC within 20 business days of receipt of the UP. Upon notice of deficiency to the Contractor from either the MBO or EFC, the Contractor shall respond with a written remedy to such notice within seven (7) business days.

In coordination with the MBO, EFC will accept an MWBE UP upon consideration of many factors, including the following:

- i. The MWBE UP indicates that the proposed goals for the project will be achieved;
- ii. A Prime Contractor, who is a certified MBE or WBE, will be credited for up to 100% of the category of their certification. However, good faith efforts to seek participation in the other category are required; and

- iii. Adequate documentation to demonstrate good faith effort and/or support a specialty equipment/services waiver as described in Section D2.
- g. **UP Acceptance:** Within 10 days of the final acceptance of a MWBE UP or Waiver Request, EFC will post the approved MWBE UP or Waiver Request on the EFC website.
- h. **Conditional Utilization Plan:** In coordination with the MBO, EFC may issue conditional acceptance of UPs pending submission of additional documentation that demonstrates there will be an increase in MWBE participation.
- i. **Revisions of the MWBE Utilization Plans:** If project conditions change such that the information submitted in the approved MWBE UP is no longer valid, the Contractor shall indicate the changes to the MBO in the next monthly report. At EFC's discretion, an updated MWBE UP form and good faith effort documentation may be required to be submitted.
- j. **Projects Co-Funded with other state/federal agencies:** In the event EFC is providing financial assistance to a project that is also financially supported by other state/federal agencies, EFC may defer to the MBE and WBE participation goals and program established by those agencies.

2. Good Faith Effort Documentation

The Prime Contractor shall maintain documentation of their efforts to solicit participation of MWBE firms for SRF-funded projects in an effort to meet the appropriate goals. In the event respective goals are not achieved, the Contractor must submit sufficient documentation to demonstrate good faith efforts have been made to provide opportunities to certified MWBE firms to participate in SRF-funded projects.

Examples of documentation of good faith efforts are set forth below:

- Information on the scope of work related to the contract and specific steps taken to reasonably structure the scope of work to break out tasks or equipment needs for the purpose of providing opportunities for subcontracting with, or obtaining supplies or services from, MBEs or WBEs.
- Printed screenshots of the directory of Certified Minority and Women Owned Businesses (MWBE directory) on ESD's website on a statewide basis, if appropriate, for both MBEs and WBEs that provide the services or equipment necessary for the contract. Contact the MBO for assistance in performing a proper search including identifying a sufficient number of solicitations to show that good faith effort was made.
- Copies of timely solicitations and documentation that the Contractor offered relevant plans, specifications, or other related materials to MBE and WBE firms on ESD's MWBE directory to participate in the work, with the responses.

The Contractor is to offer sufficient advance notice proportional to the size and complexity of the contract to enable MBEs and WBEs to prepare an informed response to the solicitations for participation as a Subcontractor or supplier. The solicitations and responses are required to be documented in a log to be submitted in the case where the goal is not met. The log should consist of the list of MBE and WBE firms solicited, their contact information, the type of work they were solicited to perform (or equipment to provide), how the solicitation was made (fax, phone, email) and the contact information, the contacts name and the outcome. If a bid was received, the bid price should also be included in the log. See a sample log entry below:

Date	M/WBE Type	Company	Scope of work	Contact Name	Phone/ Email	Solicitation Format	MWBE Response	Negotiation Required?	Selected? If not, Explain

If no response was received to an initial solicitation, at least one follow-up solicitation should be made in a different format than the first, e.g. fax followed by phone call. Any bids received from non-MWBE firms should also be tracked on the log.

Submit the EPA 6100-3 and 6100-4 forms that are required as part of all bids or proposals. A properly completed EPA 6100-3 form is good indication of a contact to an MWBE and their response to the contact. If solicitations do not result in obtaining sufficient participation of MWBE firms due to non-responsiveness, please contact the MBO or EFC MWBE representative for support.

- Copies of any advertisements of sufficient duration to effectively seek participation of certified MBE and WBEs timely published in appropriate general circulation, trade and MWBE oriented publications, together with listing and dates of publication of such advertisements. EFC recommends the use of the Contract Reporter that is free to all Contractors - <https://www.nyscr.ny.gov/>. A log should be kept of the responses to the ads, similar to the log for MWBE firm solicitation and should include the non-MWBE firms that responded and the bid prices. Any negotiations should be documented in the log.
- Documents demonstrating that insufficient MBEs or WBEs are reasonably available to perform the work. Based on the NYS Disparity Study, there is a presumption of MBE and WBE statewide availability, unless information is submitted indicating otherwise.
- A written demonstration that the Contractor offered to make up any inability to meet the project MWBE participation goals in other contracts and/or agreements performed by the Contractor on another SRF funded project.
- The date of pre-bid, pre-award, or other meetings scheduled by the Recipient, if any, and the contact information of any MBEs and WBEs who attended and are capable of performing work on the project.
- Any other information or documentation that demonstrates the Contractor conducted good faith efforts to provide opportunities for MWBE participation in their work. For instance, Prime Contractors and MBOs should develop a list of MWBE firms that have expressed interest in working on SRF funded projects
- The use of certified Disadvantaged Business Enterprises (DBE), Small Business Administration (SBA), and Veteran-Owned Small Businesses (VOSB) may be considered as a demonstration of Good Faith Efforts.

3. Subcontract Agreements

The Contractor shall submit copies of all legally signed subcontracts, agreements, and purchase orders that are referred to in the MWBE Utilization Plan to the MBO within 30 days of their execution. These subcontracts and/or purchase orders must include the following information:

- Actual dollar amount of the subcontract;
- A job description of the work to be performed by the Subcontractor;
- Signatures of both parties;
- Date of execution;
- MWBE language (included in this bid packet); and

- f. A signed EEO Policy Statement Agreement (See Required Forms).

NOTE: Purchase orders must be sent with copies of both sides of cancelled checks.

4. Monthly Reports

The Contractor must submit monthly MWBE payment reports supplemented with proof of payment to the MBO. Blank monthly report forms are available on EFC's website or from the MBO. Monthly reports should be submitted to the MBO within 3 business days after the end of each month being reported.

As part of the Monthly Report, the Contractor must provide documentation to the MBO that Subcontractors have been paid within 30 days of receipt of payment from the Recipient.

The final monthly payment report must reflect all Utilization Plan revisions and all change orders.

5. Other Contractor Responsibilities

- a. Continue good faith efforts to seek opportunities for MBE and WBE participation even if proposed goals have been achieved. In addition, any revisions to an MWBE Utilization Plan must be documented in the next monthly report to the MBO for approval.
- b. Provide written notification to the MBO and EFC of any termination of an MBE or WBE Subcontractor. This should be reported as part of the revised MWBE Utilization Plan or in a monthly report.
- c. Provide timely and complete responses to inquiries from either the MBO or EFC staff as requested.
- d. Make all MWBE documents and records available upon request to EFC staff, the MBO, or their authorized representatives.
- e. Manage the project in a manner that creates meaningful opportunities for participation by MBEs and WBEs.
- f. Provide programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination on the basis of race, color, national origin (including limited English provision), age, disability, sex, gender, sexual orientation, religion, genetic characteristics or information, status as a victim of domestic violence, veteran or military status, marital or family status, or any other discrimination prohibited by law.

Additional guidance and requirements pertaining to the preparation and submission of the MWBE Utilization Plans can be found in the [Part 1: Required Contract Language](#).

NOTE: Failure by the Contractor to receive acceptance of the MWBE Utilization Plan by the Recipient or EFC may result in withholding of progress payments. Such withholding of progress payments shall not relieve the Contractor of any contract requirements including the completion of the project within the specified contract time.

E. SUBCONTRACTOR'S MWBE RESPONSIBILITIES

Subcontractors are those individuals or business enterprises that contract directly with Contractors. Subcontractors should:

1. Maintain their MWBE certifications, and notify the Contractor and MBO of any change in their certification status.
2. Notify the Prime Contractor of any MWBE Subcontractors they hire so they may be included on the Prime's UP.
3. Respond promptly to solicitation requests by completing and submitting bid information in a timely manner.
4. Maintain business records that should include, but not be limited to, contracts/agreements, records of receipts, correspondence, purchase orders, and canceled checks.
5. Complete and submit the EPA Form 6100-3 "DBE Subcontractor Performance Form" to the Contractor prior to submission of the bid. Provide a receipt of EPA Form 6100-2 "DBE Subcontractor Participation Form" to the Contractor prior to award of contract.
6. Ensure that a required EEO Policy Statement and a copy of this Bid Packet is included in each subcontract. Additionally, signed versions of each subcontract should be sent to the MBO within 30 days of execution.
7. Provide programs to ensure that minority group members and women are afforded equal employment opportunities without discrimination on the basis of race, color, national origin (including limited English provision), age, disability, sex, gender, sexual orientation, religion, genetic characteristics or information, status as a victim of domestic violence, veteran or military status, marital or family status, or any other discrimination prohibited by law. Share EEO utilization information with the Prime Contractor.
8. Notify the MBO and EFC when contract problems arise, such as non-payment for services or when the Subcontractor is not employed as described in the MWBE Utilization Plan.
9. Perform the subcontracted scope of work in a professional and timely manner.

F. MWBE WAIVER REQUESTS

Each Contractor is required to create meaningful opportunities for certified MWBE participation and to offer the MWBE certified firms a fair share of their work. After making good faith efforts to create meaningful opportunities, a Contractor may find that it is not possible to meet the MWBE goals. In that case, the Contractor shall request a waiver from the goals.

Even if an MWBE waiver is granted, EEO information must still be submitted. The EEO utilization information is submitted as part of the Monthly Report.

1. **Preparation:** The Contractor shall complete the waiver request portion of the MWBE Utilization Plan and submit it to the MBO along with adequate good faith effort documentation and a letter explaining why the waiver is necessary.
2. **Waiver Review:** The MBO and EFC will review each waiver request based on the good faith effort criteria presented above and the documentation submitted with the waiver request. EFC will not issue any automatic waivers from MWBE responsibilities. A full or partial waiver from the MWBE goals can be requested.
3. **Specialty Equipment/Service Waiver:** A specialty equipment/service waiver may be granted in cases where:
 - a. equipment is made by only one non-MWBE manufacturer,
 - b. the technical specifications call for equipment that is not available through an MWBE supplier;
 - c. the equipment is constructed on site by specially trained non-MWBE labor;
 - d. the service is not available through an MWBE (such as work done by National Grid);

- e. the service is proprietary in nature (such as use of certain computer software necessary for control systems); or
- f. the service cannot be subcontracted (such as litigation services).

If the contract includes specialty equipment or services, and documentation is submitted demonstrating that there are no MBE/WBE firms capable of completing this portion of the contract, the specialty amount of the contract may be deducted from the total contract amount to determine the MWBE Eligible Amount and the goals would be applied to the MWBE Eligible Amount. This determination is made at the discretion of the MBO and EFC.

Example:

$$\begin{array}{rcl} \$200,000 & - & \$50,000 \\ \text{(Contract)} & \text{(Specialty equipment/service)} & \\ & & = \$150,000 \\ & & \text{(MWBE Eligible Amount)} \end{array}$$

The MWBE goal is applied to the remaining balance.

A request for this specialty equipment/service deduction can be completed by filling out section two of the MWBE Utilization Plan and submitting it to the MBO. The request must include a copy of the page from the contract where the equipment/ service is described and the cost of each item. For construction contracts, the schedule of values or bid tabulation sheet should also be submitted. Additional documentation may be requested by the MBO or EFC.

G. PROTESTS/COMPLAINTS

Subcontractors or Contractors who have any concerns, issues, or complaints regarding the implementation of the SRF MWBE/EEO Program, or wish to protest should do so in writing to the project MBO and EFC. The MBO, in consultation with EFC, will review the circumstances described in the submission, investigate to develop additional information, if warranted, and determine whether action is required. If the Subcontractor believes the issue has not been resolved to their satisfaction, they may appeal in writing to EFC for consideration.

H. WASTE, FRAUD AND ABUSE

Subcontractors, Contractors, Service Providers, or Recipients who know of or suspect any instances of waste, fraud, or abuse within the MWBE & EEO Program should notify the project MBO and EFC immediately. Additionally, suspected fraud activity should be reported to the USEPA – Office of Inspector General Hotline at (888) 546-8740, the New York State Office of Inspector General at (800) 367-4448, or the ESD Compliance Office at (212) 803-3268.

I. REMEDIES

If a Recipient makes a determination that a Contractor has been non-responsive, is non-responsible, or is in breach as a result of a failure to comply with the program requirements discussed in [Part 1: Required Contract Language](#), Recipient may withhold funds under the contract or take such other actions, impose liquidated damages or commence enforcement proceedings.

If a Contractor or Subcontractor fails to submit to Recipient an EEO policy statement within the required timeframe, Recipient may declare the contract to be null and void.

A failure to submit and/or adhere to an EEO policy statement and an MWBE Utilization Plan, and any other required reports, shall constitute a material breach of the terms of the contract between Contractor and Recipient, and justify a finding of Contractor non-responsiveness.

SECTION 3 RESTRICTIONS ON LOBBYING

*** (Applies to all contracts and subcontracts greater than \$100,000) ***

Each Contractor and Subcontractor which has a contract with Recipient exceeding \$100,000 shall provide to the Recipient a completed Certification for Contracts, Grants, Loans, and Cooperative Agreements, 40CFR Part 34 (Lobbying Certification) form. The form provides a certification that the **Contractor** or Subcontractor will not expend appropriated federal funds to pay any person for influencing or attempting to influence an officer or employee of any agency, Member of Congress, officer or employee of Congress or any employee of any Member of Congress in accordance with the provisions of 40 CFR Part 34, and to maintain such certification for their own records.

SECTION 4 AIS REQUIREMENTS

*** (Applies to all Construction contracts and subcontracts for:*

(1) CWSRF Treatment Works Projects – see Defined Terms

*(2) all DWSRF projects) ***

American Iron and Steel (AIS) requirements apply to any federally funded construction project:

- That is for the construction, alteration, maintenance, or repair of public water system or treatment works;
- Where an SRF-eligible entity executes a financial assistance agreement with the NYS Environmental Facilities Corporation (EFC) after January 17, 2014 for assistance through either the Clean Water State Revolving Fund (CWSRF) or the Drinking Water State Revolving Fund (DWSRF), and
- That did not have the project plans and specifications submitted for review by a NYS agency on or before January 17, 2014 and approved by a NYS agency before April 15, 2014.

AIS requirements apply to the whole of the project, even if the project is only partially funded by SRF funds.

The following activities must be implemented by each Contractor on an SRF funded project in order to maintain compliance with the AIS program. These contractual obligations are included in the contract language in [Part 1: Required Contract Language](#) and expanded upon below.

Note that the following information serves as a general summary of the AIS program. The Contractor should refer to the EPA website and review the [State Revolving Fund American Iron and Steel Requirement](#) for further information on specific AIS requirements.

A. DEFINITIONS

It is required that all of the iron and steel products used in the project are produced in the United States. The term “**iron and steel products**” means the following products made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

- Lined or unlined pipes or fittings
- Manhole Covers
- Municipal Castings (defined below);
- Hydrants
- Tanks
- Flanges
- Pipe clamps and restraints
- Valves
- Structural steel
- Reinforced precast concrete
- Construction materials (defined below)

For one of the listed products to be considered subject to the AIS requirement, it must be made of greater than 50% iron and steel, measured by material cost (with the exception of reinforced precast concrete products).

Municipal castings – cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

Access Hatches	Inlets
Ballast Screen	Junction Boxes
Benches (Iron or Steel)	Lampposts
Bollards	Manhole Covers, Rings and
Cast Bases	Frames, Risers
Cast Iron Hinged Hatches	Meter Boxes
Cast Iron Riser Rings	Service Boxes
Catch Basin Inlet	Steel Hinged Hatches
Cleanout/Monument Boxes	Square and Rectangular
Construction Covers and Frames	Steel Riser Rings
Curb and Corner Guards	Trash receptacles
Curb Openings	Tree Grates
Detectable Warning Plates	Tree Guards
Downspout Shoes (Boot, Inlet)	Trench Grates
Drainage Grates, Frames and Curb	Valve Boxes, Covers and Risers
Inlets	

Construction Materials – articles, materials, or supplies made primarily of iron and steel that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered “structural steel”. This includes, but is not limited to, the following products:

Wire rod
 Bar
 Angle
 Concrete Reinforcing bar
 Wire
 Wire cloth
 Wire rope and Cables
 Tubing
 Framing
 Joists
 Trusses
 Fasteners (i.e., nuts and bolts)
 Welding rods
 Decking
 Grating
 Railings
 Stairs
 Access ramps
 Fire escapes
 Ladders
 Wall panels
 Dome structures
 Roofing
 Ductwork
 Surface drains
 Cable hanging systems
 Manhole steps
 Fencing and fence tubing
 Guardrails
 Doors
 Stationary screens

NOT Considered Construction Materials: Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials:

- Pumps
- Motors
- Gear reducers
- Drives (including variable frequency drives (VFDs))
- Electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators),
- Mixers
- Gates
- Motorized screens (such as traveling screens)
- Blowers/aeration equipment
- Compressors
- Meters
- Sensors
- Controls and switches
- SCADA
- Membrane bioreactor systems
- Membrane filtration systems
- Filters
- Clarifiers and clarifier mechanisms
- Rakes
- Grinders
- Disinfection systems
- Presses (including belt presses)
- Conveyors, cranes
- HVAC (excluding ductwork)
- Water heaters
- Heat exchangers
- Generators
- Cabinetry and housings (such as electrical boxes/enclosures)
- Lighting fixtures
- Electrical conduit
- Emergency life systems
- Metal office furniture
- Shelving
- Laboratory equipment
- Analytical instrumentation
- Dewatering equipment

B. MANUFACTURER'S AIS CERTIFICATION

Each Contractor shall provide to the Recipient an executed certification from the manufacturer of the product on the form provided in the forms section of this document, that the iron and steel products and/or materials used on this project are in full compliance with the American Iron and Steel requirements in accordance with the provisions of the Consolidated Appropriations Act, and to maintain such certification for their own records.

It is recommended that a step certification process is used, in which each handler (supplier, fabricator, manufacturer, processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin.

A certification typically includes:

- a. the name of the manufacturer
- b. the location of the manufacturing facility where the product or process took place (not its headquarters)
- c. a description of the product or item being delivered
- d. a signature by a manufacturer's responsible party

These certifications should be collected and maintained by Recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or Contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information.

C. CONTRACTOR'S AIS CERTIFICATION

Each Prime Construction Contractor, or material and equipment supplier, must complete a Contractor AIS Certification form and submit to the SRF Recipient as part of the conformed bid set. The certification states that all permanent iron and steel products used on the contract will be made in the United States and that documentation will be maintained at the project locations.

D. AIS WAIVER REQUESTS

The EPA is allowed to issue waivers from the AIS requirements when:

- The application of the AIS requirements would be inconsistent with the public interest;
- Iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or
- Inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

AIS waivers can be product-specific, project-specific, regional, or nationwide. Waiver requests can only be submitted by either EFC or DOH to EPA, and only EPA can approve an AIS waiver. If the Contractor is considering requesting an AIS waiver, documentation as described in the EPA guidance should be developed and submitted to the EFC or DOH Project Engineer. See EFC's website for EPA guidance.

1. Waiver Documentation:

The Contractor shall complete the waiver request to the Recipient along with adequate good faith effort documentation. Waiver requests should include the following information:

- a. Description of the foreign and domestic construction materials
- b. Unit of measure
- c. Quantity
- d. Price
- e. Time of delivery or availability
- f. Location of the construction project
- g. Name and address of the proposed supplier
- h. A detailed justification for the use of foreign construction materials

For **Cost Waiver Requests**, the Contractor should compare the overall cost of the project with domestic iron and steel products to overall cost of the project with foreign iron and steel products. Relevant excerpts from the bid documents used by the Contractors to complete the comparison, as well as supporting documentation indicating that the Contractors made a

reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers may be used.

For **Availability Waiver Requests**, the request must include the following supporting documentation necessary to demonstrate the availability, quantity and/or quality of the materials for which the waiver is requested:

- a. Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials
- b. Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers
- c. Project schedule
- d. Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials

Availability Waiver Requests should include a statement from the prime Contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought.

2. Waiver Review:

The Recipient and EFC will review each waiver request based on the criteria presented above and the documentation submitted with the waiver request. EFC will submit waiver request directly to EPA for final approval of submission. Granting a waiver is a three-step process:

- a. Posting – After receiving an application for waiver of the AIS requirements, EPA will publish the request on its website for 15 days and receive informal comment.
- b. Evaluation – EPA will review the application to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver to make a determination.
- c. Determination – In the event that EPA finds that adequate documentation and justification has been submitted, the EPA may grant a waiver to the Recipient. The Recipient should keep a copy of the signed waiver in its project files.

E. DE MINIMIS WAIVER

The AIS de minimis waiver allows that incidental iron and steel components that are tracked in a certain manner are exempt from the AIS requirements. Items that can be subject to the de minimis waiver must be:

1. Essential, but incidental to the construction
2. Incorporated into the physical structure of the project. and
3. Often are low cost and procured in bulk.

Examples of items eligible for de minimis tracking include: washers, screws, nuts, bolts, fasteners, miscellaneous wire, corner bead, ancillary tubing, etc.

Examples of items that are NOT incidental and cannot be considered for de minimis tracking include: process fittings, tees, elbows, flanges, brackets, valves, sewer or water pipes for distribution, treatment or storage tanks, large structural support systems, etc.

To comply with the de minimis waiver, all items that are waived must meet the above criteria and must be 5% or less of the total cost of materials incorporated into the project. This can be measured on a project basis, or on a contract-by-contract basis, as long as the cost of the tracked de minimis iron and steel items is 5% or less of the total material cost of materials incorporated into the project.

Contractors should prepare a record, in spreadsheet form, which tracks the cost of all materials incorporated into the project. This spreadsheet can be either project specific or contract specific. If contract specific, a material tracking record for each construction contract should be prepared and items that are subject to the AIS de minimis waiver highlighted. There should be a clear calculation available to indicate that the cost of the de minimis iron and steel items is 5% or less of the total cost of all materials.

F. INSPECTIONS

EFC or DOH can be expected to conduct occasional site inspections that will include a review of AIS documentation for the project. Items that will be reviewed during these inspections include:

1. AIS certifications from vendors, suppliers, or manufacturers;
2. Contract and subcontracts to verify that the AIS contractual language has been included; and
3. The lists of the incidental iron and steel project components that are claimed under the AIS de minimis waiver.

G. BEST PRACTICES

The following Best Practices are suggestions and recommendations for the Contractor to remain in compliance with the AIS program. The EFC can be contacted directly with any questions regarding compliance.

1. The Contractor should carefully review the plans and specifications prepared to identify iron and steel products (as defined previously in Section 5.A) used in each project and incorporate American-made iron and steel at the time of bid.
2. The Contractor should acquire product certifications from all suppliers and manufacturers for iron and steel products verifying that the products used in the project are American-made. These certifications should be kept on file for the duration of the project and provided to the SRF Recipient.
3. The product/manufacture certifications should be submitted with each equipment/material submittal to the Recipient and/or Engineer. The Contractor should retain all delivery slips, certifications and approved submittals in their file for the duration of the project.

SECTION 5 DBRA REQUIREMENTS

*** (Applies to all Construction contracts and subcontracts greater than \$2,000 for:*

- (1) CWSRF Treatment Works Projects – see Defined Terms*
- (2) all DWSRF Projects)***

Construction Contractors and Subcontractors must comply with the Davis Bacon Related Act (DBRA) program if “yes” is answered for the following questions:

- ☐ This project involves the construction, alteration, maintenance, or repair of a public water system (DWSRF) or treatment works (CWSRF). Examples: collection systems, pump stations, and wastewater treatment plants (see definitions)
- ☐ The construction contract or subcontract is greater than \$2,000
- ☐ Any construction after October 30, 2009

DBRA requirements do not apply to non-construction contracts or for construction work categorized by EPA

as non-point source projects or estuary management program projects, unless the project involves treatment plant work. Contact EFC or DOH Project Engineer prior to bid if you have these types of projects.

The contractual obligations necessary to maintain compliance with the DBRA are included in the contract language in [Part 1: Required Contract Language](#) and expanded upon below.

Prior to bid and execution of any SRF eligible contracts, complete the following activities:

A. FEDERAL AND STATE WAGE RATES

When preparing the bid for SRF project, the Contractor must use the higher of the prevailing federal, state, or applicable local wage rates paid to each trade. These rates apply to Subcontractors working on the project as well. Federal wage rates can be found at <http://www.wdol.gov/>.

B. DEBARRED OR SUSPENDED CONTRACTORS

The Contractor should ensure that the Subcontractors bidding on the work are not included on either the state or federal debarred or suspended Contractor's list, located within the state wage rate packet and available on the US Department of Labor website <https://www.sam.gov/portal/public/SAM/>.

C. CONTRACT LANGUAGE AND WAGE RATES

The Contractor must ensure that the most recent DBRA contract language and federal wage rates are included in the contract before execution.

Davis Bacon regulations require that Recipients must amend the solicitation if the Department of Labor issues a modification to the wage rates more than 10 days prior to the closing date (i.e. bid opening) for the solicitation.

Also, if the contract has not been awarded within 90 days after bid opening, the Recipient must modify the solicitation or contract to include the most recent federal wage rates, if they have been modified. The federal wage website includes a list of wage determinations that are due for revision.

After execution of any contracts, complete the following activities:

D. WAGE RATE COMPLIANCE VERIFICATION

Contractor/Subcontractor Responsibilities:

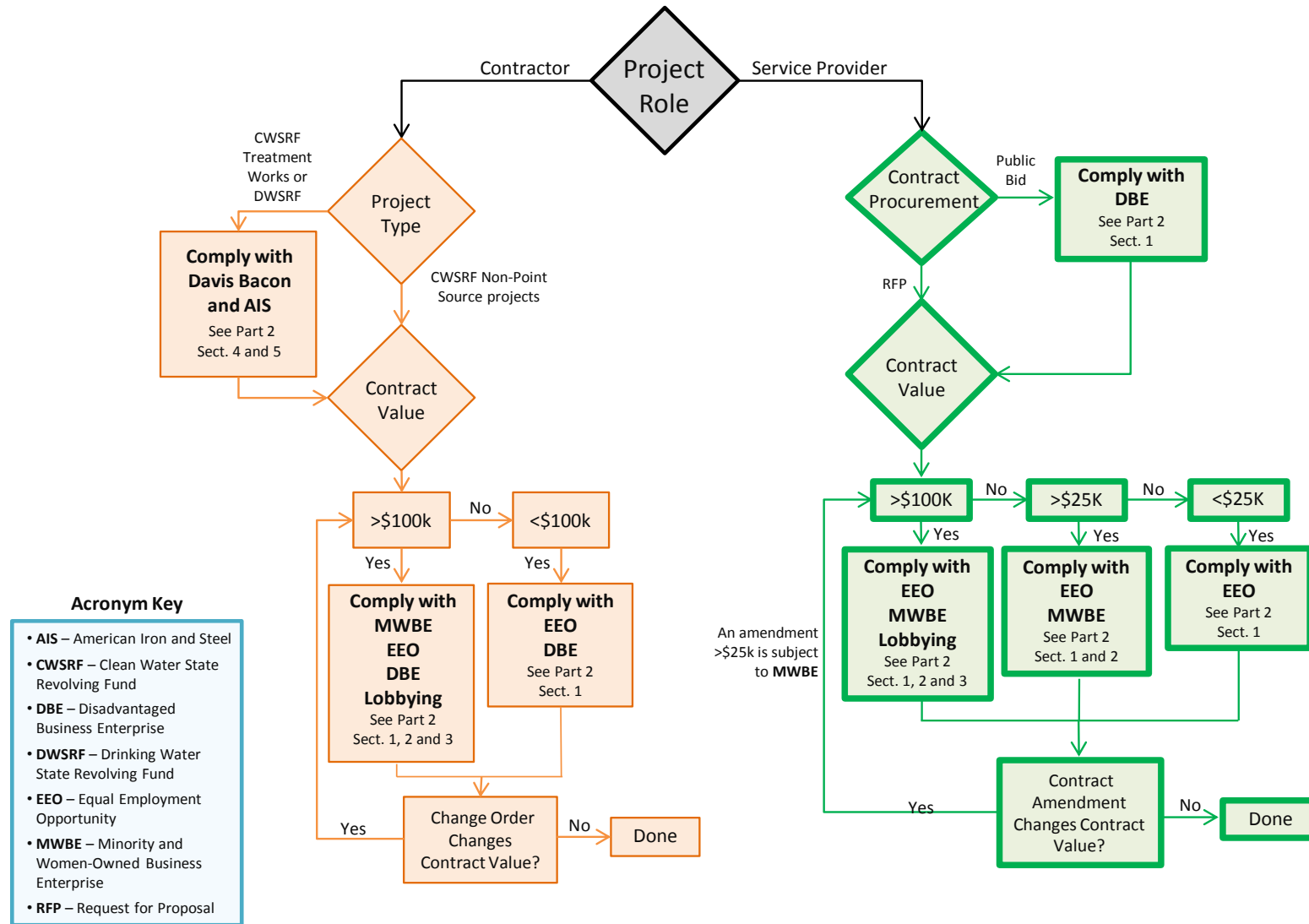
1. Post Davis Bacon Wage Poster and federal, state, and applicable local wages in a visible area at the construction site. This poster may be found on the EFC website under the Resource Library. (Refer to [Part 3: Required Forms](#))
2. Make your employees and Subcontractors' employees available for wage interviews if necessary. Wage interviews must be conducted confidentially and using Labor Standard Interview Form (SF-1445). (Refer to [Part 3: Required Forms](#))
3. Use federal payroll form WH-347 and complete the certifications on the back. If another form is being used, inform the Recipient and obtain a determination that the form is equivalent to the federal form. (Refer to [Part 3: Required Forms](#))
4. Pay the higher of prevailing federal, state, or applicable local wages, including benefits (fringe & holidays), to each trade and overtime not less than one and one-half times the basic rate of pay for hours in excess of forty hours on contracts in excess of \$100,000. The wage rates apply to Subcontractor trades as well.
5. Maintain proof of apprentice and trainee ratios for both Contractor and Subcontractor and certifications onsite.

6. Pay wages to your employees and your Subcontractors on a weekly basis. Ensure that your Subcontractors are paying their employees weekly.
7. Ensure that the subcontracts contain the Davis Bacon contract language, the federal, state, or applicable local wage determinations and equal employment opportunity language. This language is provided in the [Part 1: Required Contract Language](#). Federal wage determinations are available at www.wdol.gov.
8. Provide payroll forms and apprentice and trainee certifications to the Recipient for their records.
9. Report potential waste, fraud and abuse violations to the EPA Davis Bacon Contact and DOL Wages and Hours District Office found on their website. www.wdol.gov.
10. Any violations in payroll reporting or unpaid wages are subject to a daily monetary penalty.

Note that EFC expects to perform interim and final construction inspections. The EFC inspector can be expected to verify that the steps above are being followed and also check to ensure the proper signs and wage rates are posted in a visible area.

SECTION 6

PROGRAM DECISION TREE



PART 3:

REQUIRED FORMS

FOR CONSTRUCTION CONTRACTS

All required forms can be found on the EFC website (www.efc.ny.gov/MWBE)

To be submitted with this bid:

- ☐ *EEO Policy Statement
- ☐ Documented Proof that EPA Form 6100-2 “DBE Subcontractor Participation Form” was given to MWBE Subcontractors
- ☐ *EPA Form 6100-3 “DBE Subcontractor Performance Form”
- ☐ *EPA Form 6100-4 “DBE Subcontractor Utilization Form”
- ☐ *Lobbying Certification
(Certification for Contracts, Grants, Loans, and Cooperative Agreements)
- ☐ *AIS Contractor’s Certification

Refer to **Part 2:**

Guidance Section

[Section 1.B](#)

[Section 2.D](#)

[Section 2.D](#)

[Section 2.D](#)

[Section 3](#)

[Section 4.C](#)

To be submitted after contract award:

- ☐ MWBE Utilization Plan and/or Waiver Request
- ☐ EEO Workforce Utilization Report (part of MWBE Monthly Report Form)

[Section 2.D.1](#)

[Section 1.C](#)

Tasks for construction start:

- ☐ Post EEO Poster
- ☐ Post Davis Bacon Wage Poster AND Wage Rates
- ☐ Use Federal Payroll Form (WH-347)
- ☐ Obtain AIS Manufacturer’s Certifications for all iron & steel products

[Section 1.D](#)

[Section 5.D.1](#)

[Section 5.D.3](#)

[Section 4.B](#)

Ongoing documentation & tasks:

- ☐ Submit Monthly MWBE Reports to MBO

[Section 2.D.4](#)

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**AGREEMENT TO ABIDE BY EQUAL EMPLOYMENT OPPORTUNITY
POLICY STATEMENT REQUIREMENTS
NEW YORK STATE REVOLVING FUND (SRF)**

I, _____, am the authorized representative of _____.

Name of Representative

Name of Contractor/Service Provider

I hereby certify that _____ will abide by the equal employment

Name of Contractor/Service Provider

opportunity (EEO) policy statement provisions outlined below.

- (i) A statement that the contractor will not discriminate on the basis of race, creed, color, national origin, sex, age, disability, or marital status against any employee or applicant for employment, will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination and will make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on contracts relating to the Project.
- (ii) An agreement that all of contractor's solicitations or advertisements for employees will state that, in the performance of the contract relating to this Project, all qualified applicants will be afforded equal employment opportunities without discrimination on the basis of race, creed, color, national origin, sex, age, disability or marital status.
- (iii) An agreement to request each employment agency, labor union, or authorized representative of workers with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, labor union, or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability or marital status and that such union or representative will affirmatively cooperate in the implementation of the contractor's obligations herein.
- (iv) An agreement to comply with the provisions of the Human Rights Law (Article 15 of the Executive Law), including those relating to non-discrimination on the basis of prior criminal conviction and prior arrest, and with all other State and federal statutory constitutional non-discrimination provisions.

Blank EEO Policy Statements are available at www.efc.ny.gov/mwbe, if needed.

If contractor fails to submit to Recipient an EEO policy statement consistent with the provisions set forth above in clauses (i), (ii), (iii) and (iv) and within the timeframe required thereof, Recipient may declare this contract to be null and void.

X

Contractor/Service Provider Representative

Once completed, please provide to the Prime Contractor and/or the community MBO

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**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Participation Form**

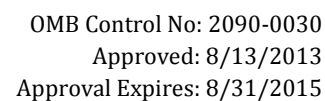
An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services , Equipment or Supplies	Amount Received by Prime Contractor

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.



Please use the space below to report any concerns regarding the above EPA-funded project:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Performance Form

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractors bid or proposal package.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services , Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: ☐ DOT ☐ SBA ☐ Other: _____		Meets/ exceeds EPA certification standards? ☐ YES ☐ NO ☐ Unknown

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Performance Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity:			

I have identified potential DBE certified subcontractors	___ YES	___ NO	
If yes, please complete the table below. If no, please explain:			
Subcontractor Name/ Company Name	Company Address/ Phone/ Email	Est. Dollar Amt	Currently DBE Certified?

Continue on back if needed

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

**CERTIFICATION
FOR
CONTRACTS, GRANTS, LOANS, AND
COOPERATIVE AGREEMENTS
40 CFR 34**

SRF Project No.: _____

The undersigned each certify, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants, and contracts under grant, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31 U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

By: _____

Name:

Title:

Date: _____

Contract ID: _____

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To be completed by prime contractors for all construction contracts

AMERICAN IRON AND STEEL (AIS) CONTRACTOR CERTIFICATION
FOR
CONSTRUCTION CONTRACTS PAID FOR WITH FUNDS FROM
THE NYS CLEAN WATER STATE REVOLVING FUND OR
THE NYS DRINKING WATER STATE REVOLVING FUND VIA THE
NYS ENVIRONMENTAL FACILITIES CORPORATION

Project Title: _____

Contractor Name: _____

Contract ID: _____

SRF Project #: _____

SRF Recipient Name: _____

I certify that the iron and steel products that will be permanently incorporated into the public water system or wastewater treatment works project under this construction contract will have been produced in the United States, in accordance with the requirements of the US Environmental Protection Agency. I will also develop and maintain at the project location the necessary documentation to demonstrate that the iron and steel products incorporated into the project were produced in the United States, and make such documentation available to The NYS Environmental Facilities Corporation or their authorized representatives, upon request.

Signature: _____

Name (print): _____

Title: _____

Date: _____

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Minority & Women Owned Business Enterprise (MWBE) Utilization Plan & Waiver Request Form

(Revised 09/2014)

The following instructions will help you complete the Utilization Plan / Waiver Request and EEO Staffing Plan Forms for the New York State Environmental Facilities Corporation (EFC) Clean & Drinking Water State Revolving Fund (CWSRF/DWSRF) program.

Instructions for Contractors & Service Providers:

You are responsible for completing sections 2, 3, & 4. **Submit the completed form to the SRF Recipient's designated Minority Business Officer (MBO) no later than the date of contract execution.** Incomplete forms will be found deficient. Copies of all forms & guidance documents are found on the MWBE webpage at <http://www.efc.ny.gov/mwbe>. All requirements described in EFC's Bid Packet must be followed. If the contract is performed under an MWBE Joint Venture or Teaming Arrangement, please fill out the additional form Joint Venture & Teaming Arrangement Form. If more than 10 subcontractors are used, additional pages for Section 3 can be found in the form Additional Utilization Plan Section 3. After signing, please send **the Word version by email** to the MBO.

The appropriate EEO goals specific to each County can be found on EFC's website. MWBE firms must be certified by the NYS Empire State Development (ESD) to be used for goal crediting purposes. Please refer to the Good Faith Effort Documentation webinar on EFC's MWBE website for guidance on searching ESD's directory.

If you require additional assistance, please contact your designated Minority Business Officer (MBO).

Instructions for Minority Business Officers (MBO):

It is EFC's intention that this form be filled out & signed electronically by both the MBO and their Authorized Representative (if applicable) by checking the boxes indicated in Section 1.

After reviewing and signing the utilization plan, please send **the Word version by email to your MWBE Representative**

When sending the email, please use a subject heading that follows the format "UP/Waiver Request, SRF Number, Contractor". NYSEFC will review and send the MBO an accepted copy of the utilization plan by email. Please retain the Word version of this document even after receiving the accepted copy as it can be modified for easy submittal of revised utilization plans.

Please ensure that the following procedures are also followed:

1. That legally signed and executed MWBE subcontracts and purchase orders are obtained from the prime contractor, contain the appropriate bid packet, and are maintained in the MBO files for review and/or inspection by EFC.
2. That documentation of proof of payments to MWBE subcontractors is obtained from the prime contractor and maintained in the MBO files for review and/or inspection by the EFC.
3. That monthly reports from prime contractors are collected and stored in the MBO files and used by the MBO or authorized representative to compile, sign and submit the quarterly report(s) to EFC.
4. That any changes in this utilization plan, including the addition or replacement of subcontractors, require written or electronic notification of the revision(s) be submitted to EFC.
5. That any contract cost increases due to change orders or amendments are reflected on quarterly reports or a revised utilization plan if over the threshold dollar amount of \$25,000.

To ensure continued compliance with the MWBE/EEO programs, all requirements described in NYSEFC's guidance document for MBOs must be followed. For more information on the roles and responsibilities of the MBO please contact EFC's MWBE Unit at 518.402.7433 or by e-mail at mwbe@efc.ny.gov.

Minority & Women Owned Business Enterprise (MWBE) Utilization Plan & Waiver Request Form
(Revised 09/2014)

SECTION 1: MUNICIPAL INFORMATION				
Recipient/Municipality:			County:	
SRF Project No.:	GIGP/EPG No.:	Contract ID:	Registration No. (NYC only):	
Minority Business Officer:		Email:		Phone #:
Address of MBO:				
Signature of MBO: (Required even if Authorized Rep. is filled out) ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.				Date:
<i>Complete if applicable: MBO may authorize representative to complete & submit quarterly payment reports.</i>				
Authorized Representative:			Title:	
Authorized Rep. Company:			Email:	Phone #:
Electronic Signature of Authorized Rep.: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and belief.				Date:

SECTION 2: PRIME CONTRACTOR / SERVICE PROVIDER INFORMATION				
If contract is performed through an MWBE Joint Venture or Teaming Arrangement please submit the additional form found at www.efc.ny.gov/mwbe				
Firm Name:			Contract Type: ☐ Construction ☐ Other Services	
Prime Firm is Certified as: ☐ MBE ☐ WBE ☐ N/A ☐ Other: Please repeat information in the Utilization Plan below (Section 3). If dual certified, you must select either MBE or WBE.				
Address:		Phone #:	Fed. Employer ID #:	
Description of Work:				
Award Date:	Start Date:	Completion Date:	MWBE GOAL Total	
Total Contract Amount: \$ MWBE Eligible Contract Amount: \$ (MWBE Goals are applied to this amount and includes all change orders, amendments, & waivers)			MBE:	% \$
			WBE:	% \$
			Total:	% \$
			PROPOSED MWBE Participation	
			MBE:	% \$
			WBE:	% \$
			Total:	% \$
If waivers are requested, documentation must be attached: ☐ Full Waiver (No Participation) ☐ Partial Waiver (Short of the MWBE Goal)				
☐ Specialty Equipment/Services Waiver (must be of SIGNIFICANT cost - list of equipment and cost & good faith effort documentation must be attached)				
Electronic Signature of Contractor: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge and that all MWBE subcontractors will perform a commercially useful function.				Date:
Name (Please Type):				

Minority & Women Owned Business Enterprise (MWBE) Utilization Plan & Waiver Request Form
(Revised 09/2014)

SECTION 3: UTILIZATION PLAN

This Submittal is: ☐ The First/Original Utilization Plan ☐ Revised Utilization Plan #:				
NYS Certified M/WBE Contractor & Subcontractor Info (MBO to check certifications)		Contract Amount:		For EFC Use:
		MBE (\$)	WBE (\$)	
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Full Contract Amount: \$	Completion Date:			
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Full Contract Amount: \$	Completion Date:			
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Full Contract Amount: \$	Completion Date:			
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Full Contract Amount: \$	Completion Date:			
Name:	Fed. Employer ID#:			
Address:	Phone #:			
Scope of Work:	Email:			
Select Only One: ☐ MBE ☐ WBE ☐ Other:	Start Date:			
Full Contract Amount: \$	Completion Date:			

Minority & Women Owned Business Enterprise (MWBE) Utilization Plan & Waiver Request Form

(Revised 09/2014)

SECTION 4: EEO STAFFING PLAN (Service Providers Only - Instructions on the following page)

Municipality:	County:	SRF Project No.:	Contract ID:
Service Provider Name:		Date:	

Report Includes – Please select one from the options below:

- ☐ Workforce utilized on this contract
- ☐ Contractor/subcontractor's total workforce

Reporting Entity – Please select one from the options below:

- ☐ Prime Service Provider
- ☐ Subcontractor

Job Categories	Hispanic/ Latino		Not Hispanic or Latino											
			Male						Female					
	Male	Female	White	Black/ African American	Native Hawaiian/ Other Pacific Islander	Asian	Native American/ Alaska Native	Two or More Races	White	Black/ African American	Native Hawaiian/ Other Pacific Islander	Asian	Native American/ Alaska Native	Two or More Races
Senior Level Officials/Managers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mid-Level Officials/Managers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Professionals	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Technicians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sales Workers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Administrative Support Workers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Skilled Craftsmen	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operatives Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laborers & Helpers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Service Workers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Journeypersons														
Apprentices														
Trainees														

Electronic Signature of Service Provider: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge.

Name (Please Type):

Date:

Minority & Women Owned Business Enterprise (MWBE) Utilization Plan & Waiver Request Form
(Revised 09/2014)

INSTRUCTIONS

General Instructions: All Service Providers (including legal, engineering, financial advisory or other professional services, and labor) and each subcontractor identified in the bid or proposal must complete an EEO Staffing Plan and submit it as part of the MWBE Utilization Plan no later than the date of execution of the contract.

Where the work force to be utilized in the performance of the contract **can** be separated out from the contractor's or subcontractors' total work force, the contractor shall complete this form *only for the anticipated work force to be utilized on the contract*. Where the work force to be utilized in the performance of the contract **cannot** be separated out from the contractor's or subcontractors' total work force, the contractor shall complete this form for the contractor's or subcontractors' *total work force*.

RACE/ETHNIC IDENTIFICATION: Definitions of race and ethnicity for purposes of completion of this form are as follows:

- **Hispanic or Latino** - A person having origins in Cuba, Mexico, Puerto Rico, South or Central America.
- **White** - A person having origins of Europe, the Middle East, or North Africa.
- **Black or African-American** - A person having origins in any of the black racial groups of Africa.
- **Native Hawaiian or Other Pacific Islander**- A person having origins in any of the peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
- **Asian** - A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent
- **American Indian or Alaska Native** – **A person having** origins in any of the original peoples of North, Central, and South America and who maintain tribal affiliation or community attachment.
- **Two or More Races** - All persons who identify with more than one of the above (Non-Hispanic or Latino) five races.

DESCRIPTION OF JOB CATEGORIES

The major job categories used in EEO Staffing Plan are listed below.

Senior Level Officials and Managers - Individuals residing in the highest levels of organizations who plan, direct and formulate policies, set strategy and provide the overall direction of enterprises/organizations for the development and delivery of products or services.

Mid-Level Officials and Managers - Individuals who receive directions from the Senior Level management and serve as managers, other than those who serve as Senior Level Officials and Managers, including those who oversee and direct the delivery of products, services or functions at group, regional or divisional levels of organizations

Professionals - Most jobs in this category require bachelor and graduate degrees, and/or professional certification. In some instances, comparable experience may establish a person's qualifications.

Technicians - Jobs in this category include activities that require applied scientific skills, usually obtained by post-secondary education of varying lengths, depending on the particular occupation, recognizing that in some instances additional training, certification, or comparable experience is required.

Sales Workers - These jobs include non-managerial activities that wholly and primarily involve direct sales.

Administrative Support Workers - These jobs involve non-managerial tasks providing administrative and support assistance, primarily in office settings.

Skilled Craftsmen – Includes higher skilled occupations in construction (building trades craft workers and their formal apprentices) and natural resource extraction workers. Examples of these types of positions include: boilermakers; brick and stone masons; carpenters; electricians; painters

Operatives Semi-Skilled - Most jobs in this category include intermediate skilled occupations and include workers who operate machines or factory-related processing equipment. Most of these occupations do not usually require more than several months of training. Examples include: textile machine workers;

Laborers & Helpers - Jobs in this category include workers with more limited skills who require only brief training to perform tasks that require little or no independent judgment.

Service Workers - Jobs in this category include food service, cleaning service, personal service, and protective service activities.

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**CONTRACTOR'S Minority & Women Owned Business Enterprise (MWBE) Monthly Report
& EEO Workforce Utilization Report**

NYS Certified M/WBE Contractor & Subcontractor	Please Specify Any Revisions this Month.	Subcontractor Contract Amount		Payments this Month	Previous Payments	Total Payments Made to Date
		Original	Revised			
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: Select Only One: ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					

**CONTRACTOR'S Minority & Women Owned Business Enterprise (MWBE) Monthly Report
& EEO Workforce Utilization Report**

NYS Certified M/WBE Contractor & Subcontractor	Please Specify Any Revisions this Month.	Subcontractor Total Amount		Payments this Month	Previous Payments	Total Payments Made to Date
		Original	Revised			
Name: Fed. Employer ID#: <u>Select Only One:</u> ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Select Only One:</u> ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Select Only One:</u> ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Select Only One:</u> ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Select Only One:</u> ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Select Only One:</u> ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Name: Fed. Employer ID#: <u>Select Only One:</u> ☐ MBE ☐ WBE ☐ Broker ☐ Supplier ☐ Other:	☐ Subcontractor is REMOVED ☐ NEW Subcontractor ☐ Subcontract Amt. INCREASED ☐ Subcontract Amt. DECREASED					
Additional Pages can be found at www.nysefc.org TOTAL						
Please explain any revisions:						

EQUAL EMPLOYMENT OPPORTUNITY (EEO) – WORKFORCE UTILIZATION REPORT (Revised 3/2012)

(Instruction on following page)

Municipality:	County:	SRF Project No.:	Contract ID:
Contractor/Service Provider:		Date:	

Report Includes – Please select one from the options below:

- ☐ Construction Contracts - Report the hours of contractor's and ALL subcontractor's employees who worked on contract activities during the month
- ☐ Service Provider Contracts - Report the Actual Contractor/subcontractor's workforce (# of personnel) utilized on this contract.

Job Categories	Hispanic/ Latino		Non-Hispanic / Latino											
			Male						Female					
	Male	Female	White	Black/ African American	Native Hawaiian/ Other Pacific Islander	Asian	Native American/ Alaska Native	Two or More Races	White	Black/ African American	Native Hawaiian/ Other Pacific Islander	Asian	Native American/ Alaska Native	Two or More Races
Senior Level Officials/Managers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mid-Level Officials/Managers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Professionals	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Technicians	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sales Workers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Administrative Support Workers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Skilled Craftsmen	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operatives Semi-Skilled	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laborers & Helpers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Service Workers	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Journeypersons														
Apprentices														
Trainees														

Service Provider Contracts Only: ☐ There are no changes to the workforce utilized on this contract since the last EEO Workforce Utilization Report

Electronic Signature of Contractor: ☐ I certify that the information submitted herein is true, accurate and complete to the best of my knowledge.

Name (Please Type):

Date:

EQUAL EMPLOYMENT OPPORTUNITY (EEO) – WORKFORCE UTILIZATION REPORT (Revised 3/2012)

INSTRUCTIONS

General Instructions: All Contractors and each subcontractor identified in the approved MWBE Utilization Plan must complete an EEO Workforce Utilization Report and submit it with the MWBE Quarterly Reports.

Construction Contracts: Report the hours of contractor's and ALL subcontractors' employees who worked on contract activities for each month.

Non-Construction Contracts: Where the work force to be utilized in the performance of the contract can be separated out from the contractor's or subcontractors' total workforce, the contractors shall *complete this form only for the actual work force utilized on the contract*. Where the workforce utilized in the performance of the contract cannot be separated out from the contractor's or subcontractors' total workforce, the contractors shall *complete this form for the contractor's or subcontractors' total workforce*.

RACE/ETHNIC IDENTIFICATION: Definitions of race and ethnicity for purposes of completion of this form are as follows:

- **Hispanic or Latino** - A person having origins in Cuba, Mexico, Puerto Rico, South or Central America.
- **White** - A person having origins of Europe, the Middle East, or North Africa.
- **Black or African-American** - A person having origins in any of the black racial groups of Africa.
- **Native Hawaiian or Other Pacific Islander** - A person having origins in any of the peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
- **Asian** - A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent
- **American Indian or Alaska Native** - Origins in any of the original peoples of North, Central, and South America and who maintain tribal affiliation or community attachment
- **Two or More Races** - All persons who identify with more than one of the above five races.

DESCRIPTION OF JOB CATEGORIES

The major job categories used in EEO Workforce Utilization Report are listed below.

Senior Level Officials and Managers - Individuals residing in the highest levels of organizations who plan, direct and formulate policies, set strategy and provide the overall direction of enterprises/organizations for the development and delivery of products or services.

Mid-Level Officials and Managers - Individuals who receive directions from the Senior Level management and serve as managers, other than those who serve as Senior Level Officials and Managers, including those who oversee and direct the delivery of products, services or functions at group, regional or divisional levels of organizations

Professionals - Most jobs in this category require bachelor and graduate degrees, and/or professional certification. In some instances, comparable experience may establish a person's qualifications.

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Sales Workers - These jobs include non-managerial activities that wholly and primarily involve direct sales.

Administrative Support Workers - These jobs involve non-managerial tasks providing administrative and support assistance, primarily in office settings.

Skilled Craftsmen – Includes higher skilled occupations in construction (building trades craft workers and their formal apprentices) and natural resource extraction workers. Examples of these types of positions include: boilermakers; brick and stone masons; carpenters; electricians; painters

Operatives Semi-Skilled - Most jobs in this category include intermediate skilled occupations and include workers who operate machines or factory-related processing equipment. Most of these occupations do not usually require more than several months of training. Examples include: textile machine workers;

Laborers & Helpers - Jobs in this category include workers with more limited skills who require only brief training to perform tasks that require little or no independent judgment.

Service Workers - Jobs in this category include food service, cleaning service, personal service, and protective service activities.

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Equal Employment Opportunity is **THE LAW**

Private Employers, State and Local Governments, Educational Institutions, Employment Agencies and Labor Organizations

Applicants to and employees of most private employers, state and local governments, educational institutions, employment agencies and labor organizations are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Title VII of the Civil Rights Act of 1964, as amended, protects applicants and employees from discrimination in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment, on the basis of race, color, religion, sex (including pregnancy), or national origin. Religious discrimination includes failing to reasonably accommodate an employee's religious practices where the accommodation does not impose undue hardship.

DISABILITY

Title I and Title V of the Americans with Disabilities Act of 1990, as amended, protect qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship.

AGE

The Age Discrimination in Employment Act of 1967, as amended, protects applicants and employees 40 years of age or older from discrimination based on age in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment.

SEX (WAGES)

In addition to sex discrimination prohibited by Title VII of the Civil Rights Act, as amended, the Equal Pay Act of 1963, as amended, prohibits sex discrimination in the payment of wages to women and men performing substantially equal work, in jobs that require equal skill, effort, and responsibility, under similar working conditions, in the same establishment.

GENETICS

Title II of the Genetic Information Nondiscrimination Act of 2008 protects applicants and employees from discrimination based on genetic information in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. GINA also restricts employers' acquisition of genetic information and strictly limits disclosure of genetic information. Genetic information includes information about genetic tests of applicants, employees, or their family members; the manifestation of diseases or disorders in family members (family medical history); and requests for or receipt of genetic services by applicants, employees, or their family members.

RETALIATION

All of these Federal laws prohibit covered entities from retaliating against a person who files a charge of discrimination, participates in a discrimination proceeding, or otherwise opposes an unlawful employment practice.

WHAT TO DO IF YOU BELIEVE DISCRIMINATION HAS OCCURRED

There are strict time limits for filing charges of employment discrimination. To preserve the ability of EEOC to act on your behalf and to protect your right to file a private lawsuit, should you ultimately need to, you should contact EEOC promptly when discrimination is suspected:

The U.S. Equal Employment Opportunity Commission (EEOC), 1-800-669-4000 (toll-free) or 1-800-669-6820 (toll-free TTY number for individuals with hearing impairments). EEOC field office information is available at www.eeoc.gov or in most telephone directories in the U.S. Government or Federal Government section. Additional information about EEOC, including information about charge filing, is available at www.eeoc.gov.

Employers Holding Federal Contracts or Subcontracts

Applicants to and employees of companies with a Federal government contract or subcontract are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Executive Order 11246, as amended, prohibits job discrimination on the basis of race, color, religion, sex or national origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment.

INDIVIDUALS WITH DISABILITIES

Section 503 of the Rehabilitation Act of 1973, as amended, protects qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship. Section 503 also requires that Federal contractors take affirmative action to employ and advance in employment qualified individuals with disabilities at all levels of employment, including the executive level.

DISABLED, RECENTLY SEPARATED, OTHER PROTECTED, AND ARMED FORCES SERVICE MEDAL VETERANS

The Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, 38 U.S.C. 4212, prohibits job discrimination and requires affirmative action to employ and advance in employment disabled veterans, recently separated veterans (within

three years of discharge or release from active duty), other protected veterans (veterans who served during a war or in a campaign or expedition for which a campaign badge has been authorized), and Armed Forces service medal veterans (veterans who, while on active duty, participated in a U.S. military operation for which an Armed Forces service medal was awarded).

RETALIATION

Retaliation is prohibited against a person who files a complaint of discrimination, participates in an OFCCP proceeding, or otherwise opposes discrimination under these Federal laws.

Any person who believes a contractor has violated its nondiscrimination or affirmative action obligations under the authorities above should contact immediately:

The Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, 1-800-397-6251 (toll-free) or (202) 693-1337 (TTY). OFCCP may also be contacted by e-mail at OFCCP-Public@dol.gov, or by calling an OFCCP regional or district office, listed in most telephone directories under U.S. Government, Department of Labor.

Programs or Activities Receiving Federal Financial Assistance

RACE, COLOR, NATIONAL ORIGIN, SEX

In addition to the protections of Title VII of the Civil Rights Act of 1964, as amended, Title VI of the Civil Rights Act of 1964, as amended, prohibits discrimination on the basis of race, color or national origin in programs or activities receiving Federal financial assistance. Employment discrimination is covered by Title VI if the primary objective of the financial assistance is provision of employment, or where employment discrimination causes or may cause discrimination in providing services under such programs. Title IX of the Education Amendments of 1972 prohibits employment discrimination on the basis of sex in educational programs or activities which receive Federal financial assistance.

INDIVIDUALS WITH DISABILITIES

Section 504 of the Rehabilitation Act of 1973, as amended, prohibits employment discrimination on the basis of disability in any program or activity which receives Federal financial assistance. Discrimination is prohibited in all aspects of employment against persons with disabilities who, with or without reasonable accommodation, can perform the essential functions of the job.

If you believe you have been discriminated against in a program of any institution which receives Federal financial assistance, you should immediately contact the Federal agency providing such assistance.

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES	You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.
OVERTIME	You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.
ENFORCEMENT	Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.
APPRENTICES	Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.
PROPER PAY	If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.



For additional information:
1-866-4-USWAGE
(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV

Text Left Blank

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT. OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS						(9) NET WAGES PAID FOR WEEK
														FICA	WITH- HOLDING TAX			OTHER	TOTAL DEDUCTIONS	
				HOURS WORKED EACH DAY																
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Date _____

I, _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by _____ on the _____
(Contractor or Subcontractor)
_____ ; that during the payroll period commencing on the _____
(Building or Work)
_____ day of _____, _____, and ending the _____ day of _____, _____,
all persons employed on said project have been paid the full weekly wages earned, that no rebates have
been or will be made either directly or indirectly to or on behalf of said _____
_____ from the full
(Contractor or Subcontractor)
weekly wages earned by any person and that no deductions have been made either directly or indirectly
from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part
3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948,
63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are
correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the
applicable wage rates contained in any wage determination incorporated into the contract; that the
classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide
apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of
Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a
State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:
(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS
☐ — in addition to the basic hourly wage rates paid to each laborer or mechanic listed in
the above referenced payroll, payments of fringe benefits as listed in the contract
have been or will be made to appropriate programs for the benefit of such
employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ — Each laborer or mechanic listed in the above referenced payroll has been paid,
as indicated on the payroll, an amount not less than the sum of the applicable
basic hourly wage rate plus the amount of the required fringe benefits as listed
in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR
SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE
31 OF THE UNITED STATES CODE.

Example AIS Manufacturer's Certifications

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

Example AIS Manufacturer's Certifications

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

EXHIBIT F

**NY PREVAILING WAGE RATE SCHEDULE
AND LABOR REGULATIONS**



Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Town of North Castle

Nicholas Hyde, Project Manager
GHD
One Remington Park Drive
Cazenovia NY 13035

Schedule Year 2015 through 2016
Date Requested 09/28/2015
PRC# 2015010153

Location North Broadway Pump Station
Project ID# 1 - General
Project Type Installation of a Ultraviolet Light Disinfection System at an existing drinking water pump station.

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 2015 through June 2016. 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.state.ny.us. 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 12240

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.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the "[4 Day / 10 Hour Work Schedule](#)" form (PW 30R).

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 form 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 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.state.ny.us.

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.state.ny.us.

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.state.ny.us.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. Payrolls must be maintained for at least three (3) years from the project's date of completion. 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.

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 12240 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.



Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Town of North Castle

Nicholas Hyde, Project Manager
GHD
One Remington Park Drive
Cazenovia NY 13035

Schedule Year 2015 through 2016
Date Requested 09/28/2015
PRC# 2015010153

Location North Broadway Pump Station
Project ID# 1 - General
Project Type Installation of a Ultraviolet Light Disinfection System at an existing drinking water pump station.

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: ____/____/____	☐ (01) General Construction	
Approximate Completion Date: ____/____/____	☐ (02) Heating/Ventilation	
	☐ (03) Electrical	
	☐ (04) Plumbing	
	☐ (05) Other : _____	

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

IMPORTANT NOTICE

FOR

CONTRACTORS & CONTRACTING AGENCIES

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' concerns with regard to 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.*

NOTE: This change does not affect the Department's ability to request and receive the entire social security number from employers during the course of its public work / prevailing wage investigations.

**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 12240

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.

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, www.labor.ny.gov.

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.state.ny.us.



New York State Department of Labor
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 such as
 - o unemployment benefits, if unemployed through no fault of your own, able to work, and otherwise qualified
 - o workers' compensation benefits for on-the-job injuries
 - o payment for wages earned, minimum wage, and overtime (under certain conditions)
 - o prevailing wages on public work projects
 - o the provisions of the National Labor Relations Act and
 - o 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 required by New York State and Federal Law.

Penalties for paying 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, 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 1(866)435-1499 or send an email to dol.misclassified@labor.state.ny.us. All complaints of fraud and violations are taken seriously and you can remain anonymous.

Employer Name:

WORKER NOTIFICATION

(Labor Law §220, paragraph a of subdivision 3-a)

Effective February 24, 2008

This provision is an addition to the existing prevailing 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 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 particular job classification. The required notification will be provided with each wage schedule, may be downloaded from our website www.labor.state.ny.us or made available upon request by contacting the Bureau of Public Work at 518-457-5589.

* In the event that the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.



New York State Department of Labor
Bureau of Public Work

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.

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:**
www.labor.ny.gov

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) 775-3568	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: _____

OSHA 10-hour Construction Safety and Health Course – S1537-A

Effective July 18, 2008

This provision is an addition to the existing prevailing wage rate law, Labor Law §220, section 220-h. It requires that on all public work projects of at least \$250,000.00, all laborers, workers and mechanics working on the site, be certified as having successfully completed the OSHA 10-hour construction safety and health course. It further requires that the advertised bids and contracts for every public work contract of at least \$250,000.00, contain a provision of this requirement.

NOTE: The OSHA 10 Legislation only applies to workers on a public work project that are required, under Article 8, to receive the prevailing wage.

Where to find OSHA 10-hour Construction Course

1. NYS Department of Labor website for scheduled outreach training at:

www.labor.state.ny.us/workerprotection/safetyhealth/DOSH_ONSITE_CONSULTATION.shtm

2. OSHA Training Institute Education Centers:

Rochester Institute of Technology OSHA Education Center

Rochester, NY

Donna Winter

Fax (585) 475-6292

e-mail: dlwtpo@rit.edu

(866) 385-7470 Ext. 2919

www.rit.edu/~outreach/course.php3?CourseID=54

Atlantic OSHA Training Center

UMDNJ – School of Public Health

Piscataway, NJ

Janet Crooks

Fax (732) 235-9460

e-mail: crooksje@umdnj.edu

(732) 235-9455

<https://ophp.umdnj.edu/wconnect/ShowSchedule.awp?~~GROUP~AOTCON~10~>

Atlantic OSHA Training Center

University at Buffalo

Buffalo, New York

Joe Syracuse

Fax (716) 829-2806

e-mail: mailto:japs@buffalo.edu

(716) 829-2125

http://www.smbs.buffalo.edu/CENTERS/trc/schedule_OSHA.php

Keene State College

Manchester, NH

Leslie Singleton

e-mail: lsingletin@keene.edu

(800) 449-6742

www.keene.edu/courses/print/courses_oshacfm

3. List of trainers and training schedules for OSHA outreach training at:

www.OutreachTrainers.org

Requirements for OSHA 10 Compliance

Chapter 282 of the Laws of 2007, codified as Labor Law 220-h took effect on July 18, 2008. The statute provides as follows:

The advertised specifications for every contract for public work of \$250,000.00 or more 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 of 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 518-485-5696.

WICKS Reform 2008

(For all contracts advertised or solicited for bid on or after 7/1/08)

- Raises the threshold for public work projects subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work. The total project's threshold would increase from \$50,000 to: \$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 work 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 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.
- Reduces from 15 to 7 days the period in which contractors must pay subcontractors.

IMPORTANT INFORMATION

Regarding Use of Form PW30R

“Employer Registration for Use of 4 Day / 10 Hour Work Schedule”

To use the ‘4 Day / 10 Hour Work Schedule’:

There **MUST** be a *Dispensation of Hours (PW30)* in place on the project

AND

You **MUST** register your intent to work 4 / 10 hour days, by completing the PW30R Form.

REMEMBER...

The ‘4 Day / 10 Hour Work Schedule’ applies **ONLY** to Job Classifications and Counties listed on the PW30R Form.

Do not write in any additional Classifications or Counties.

(Please note : For each Job Classification check the individual wage schedule for specific details regarding their 4/10 hour day posting.)

Instructions for Completing Form PW30R

“Employer Registration for Use of 4 Day / 10 Hour Work Schedule”

Before completing Form PW30R check to be sure ...

- There is a *Dispensation of Hours* in place on the project.
- The 4 Day / 10 Hour Work Schedule applies to the Job Classifications you will be using.
- The 4 Day / 10 Hour Work Schedule applies to the County / Counties where the work will take place.

Instructions (Type or Print legibly):

Contractor Information:

- Enter the Legal Name of the business, FEIN, Street Address, City, State, Zip Code; the Company's Phone and Fax numbers; and the Company's email address (if applicable)
- Enter the Name of a Contact Person for the Company along with their Phone and Fax numbers, and the personal email address (if applicable)

Project Information:

- Enter the Prevailing Rate Case number (PRC#) assigned to this project
- Enter the Project Name / Type (i.e. Smithtown CSD – Replacement of HS Roof)
- Enter the Exact Location of Project (i.e. Smithtown HS, 143 County Route #2, Smithtown, NY; Bldgs. 1 & 2)
- If you are a Subcontractor, enter the name of the Prime Contractor for which you work
- On the Checklist of Job Classifications -
 - Go to pages 2 and 3 of the form
 - Place a checkmark in the box to the right of the Job Classification you are choosing
 - Mark all Job Classifications that apply

Do not write in any additional Classifications or Counties.

Requestor Information:

- Enter the name of the person submitting the registration, their title with the company, and the date the registration is filled out

Return Completed Form:

- **Mail** the completed PW30R form (3 pages) to: NYSDOL Bureau of Public Work, SOBC – Bldg.12 – Rm.130, Albany, NY 12240 **-OR-**
- **Fax** the completed PW30R form (3 pages) to: NYSDOL Bureau of Public Work at (518)485-1870



New York State Department of Labor
Bureau of Public Work
W. Averell Harriman State Office Campus
Building 12 - Room 130
Albany, New York 12240
Phone - (518) 457-5589 Fax - (518) 485-1870

Employer Registration for Use of 4 Day / 10 Hour Work Schedule

Before completing Form PW30R check to be sure ...

There is a *Dispensation of Hours* in place on the project.

The 4 Day / 10 Hour Work Schedule applies to the Job Classifications you will be using.

The 4 Day / 10 Hour Work Schedule applies to the County / Counties where the work will take place.

Please Type or Print the Requested Information

When completed ...

Mail to NYSDOL Bureau of Public Work, SOBC, Bldg. 12, Rm.130, Albany, NY 12240

-or-

Fax to NYSDOL Bureau of Public Work at (518) 485-1870

Contractor Information

Company Name: _____ FEIN: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone Number _____ Fax Number: _____ Email Address: _____

Contact Person: _____

Phone No: _____ Fax No: _____ Email: _____

Project Information

Project PRC#: _____ Project Name/Type: _____

Exact Location
of Project: _____ County: _____

(If you are Subcontractor)

Prime Contractor Name: _____

Job Classification(s) to Work 4/10 Schedule: (Choose all that apply on Job Classification Checklist - Pages 2 & 3)
*** Do not write in any additional Classifications or Counties***

Requestor Information

Name: _____

Title: _____ Date : _____

Please use the list below with the number assigned to each county as a reference to the corresponding numbers listed in the following pages under "Entire Counties" & "Partial Counties".

1. Albany County	33. Oneida County
2. Allegany County	34. Onondaga County
3. Bronx County	35. Ontario County
4. Broome County	36. Orange County
5. Cattaraugus County	37. Orleans County
6. Cayuga County	38. Oswego County
7. Chautauqua County	39. Otsego County
8. Chemung County	40. Putnam County
9. Chenango County	41. Queens County
10. Clinton County	42. Rensselaer County
11. Columbia County	43. Richmond County (Staten Island)
12. Cortland County	44. Rockland County
13. Delaware County	45. Saint Lawrence County
14. Dutchess County	46. Saratoga County
15. Erie County	47. Schenectady County
16. Essex County	48. Schoharie County
17. Franklin County	49. Schuyler County
18. Fulton county	50. Seneca County
19. Genesee County	51. Steuben County
20. Greene County	52. Suffolk County
21. Hamilton County	53. Sullivan County
22. Herkimer County	54. Tioga County
23. Jefferson County	55. Tompkins County
24. Kings County (Brooklyn)	56. Ulster County
25. Lewis County	57. Warren county
26. Livingston County	58. Washington County
27. Madison County	59. Wayne County
28. Monroe County	60. Westchester County
29. Montgomery County	61. Wyoming County
30. Nassau County	62. Yates County
31. New York County (Manhattan)	
32. Niagara County	

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Carpenter-Building	276B-All	7	2, 5	☐
Carpenter-Building	276B-Cat	15	5	☐
Carpenter-Building	276-B-B-Liv	26, 28, 35, 59	61	☐
Carpenter-Building	276B-Gen	19, 32, 37	61	☐
Carpenter-Floor Layers	276B-FL-Liv	26, 28, 35, 59	61	☐
Carpenter-Heavy & Highway	276HH-All	2, 5, 7		☐
Carpenter-Heavy & Highway	276HH-Erie	15		☐
Carpenter-Heavy & Highway	276HH- Gen	19, 32, 37, 61		☐
Carpenter-Heavy & Highway	276HH-Liv	26, 28, 35, 59		☐
Carpenter-Residential	276R-All	7	2, 5	☐
Carpenter - Building	277B-Bro	4, 54		☐
Carpenter - Building	277B-Cay	6, 50, 62		☐
Carpenter - Building	277B-CS	8, 12, 49, 51, 55	2	☐
Carpenter - Building	277 JLS	23, 25, 45		☐
Carpenter - Building	277 omh	22, 27, 33		☐
Carpenter - Building	277 On	34		☐
Carpenter - Building	277 Os	38		☐
Carpenter - Building	277CDO Bldg	9, 13, 39		☐
Carpenter - Heavy & Highway	277CDO HH	9, 13, 39		☐
Carpenter - Heavy & Highway	277HH-BRO	4, 6, 8, 12, 49, 50, 51, 54, 55, 62		☐
Carpenter - Heavy & Highway	277 oneida	22, 23, 25, 27, 33, 34, 38, 45		☐
Carpenter - Building	291B-Alb	1, 18, 20, 29, 42, 47, 48		☐
Carpenter - Building	291B-Cli	10, 16, 17		☐
Carpenter - Building	291B-Ham	21, 57, 58		☐
Carpenter - Building	291B-Sar	46		☐
Carpenter - Heavy & Highway	291HH-Alb	1, 10, 16, 17, 18, 20, 21, 29, 42, 46, 47, 48, 57, 58		☐
Electrician	25m	30, 52		☐
Electrician-Teledata Cable Splicer	43	12, 22, 27, 33, 38	6, 9, 34, 39, 55, 59	☐

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Electrician	86	26, 28	19, 35, 37, 59, 61	☐
Electrician	840Teledata and 840 Z1	62	6, 34, 35, 50, 59	☐
Electrician	910	10, 16, 17, 23, 25, 45		☐
Electrician Lineman	1049Line/Gas	30, 41, 52		☐
Electrician Lineman	1249a	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 44, 46, 47, 48, 49, 50, 45, 51, 53, 54, 55, 56, 57, 58, 59, 61, 62		☐
Electrician Lineman	1249a West	60		☐
Electrician Lineman	1249a-LT	1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 35, 37, 38, 39, 42, 46, 47, 48, 49, 50, 45, 51, 53, 54, 55, 57, 58, 59, 61, 62		☐
Electrician Lineman	1249aREG8LT	11, 14, 36, 40, 44, 56		☐
Electrician Lineman	1249aWestLT	60		☐
Elevator Constructor	138	11, 14, 20, 36, 40, 53, 56	13, 44, 60	☐
Elevator Constructor	14	2, 5, 7, 15, 19, 32, 37, 61		☐
Elevator Constructor	27	8, 26, 28, 35, 49, 50, 51, 59, 62		☐
Elevator Constructor	35	1, 10, 16, 18, 21, 22, 29, 39, 42, 46, 47, 48, 57, 58		☐
Elevator Constructor	62.1	4, 6, 9, 12, 23, 25, 27, 33, 34, 38, 45, 54, 55	13	☐
Glazier	201	1, 10, 11, 16, 17, 18, 20, 21, 29, 42, 46, 47, 48, 57, 58		☐
Glazier	660r	2, 5, 7, 15, 19, 32, 37, 61		☐
Glazier	660	2, 5, 7, 15, 19, 32, 37, 61		☐
Glazier	677.1	23, 25, 26, 28, 35, 45, 50, 59, 62		☐
Glazier	677Z-2	6, 12, 22, 27, 33, 34, 38		☐
Glazier	677z3	4, 8, 9, 13, 39, 49, 51, 54, 55		☐
Glazier	677r.2	6, 12, 22, 27, 33, 34, 38		☐
Insulator - Heat & Frost	30-Syracuse	4, 6, 8, 9, 12, 22, 23, 25, 27, 33, 34, 38, 39, 49, 50, 45, 54, 55		☐
Laborers - Building	785(7)	4	9, 13, 54	☐

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Laborers - Building	785B-CS	8, 51	49	☐
Laborers- Heavy & Highway	7-785b	12, 55	49, 54	☐
Laborers Heavy & Highway	785(7)	4	9, 13, 54	☐
Laborer - Heavy & Highway	785HH-CS	8, 51	49	☐
Laborer - Building	621b	2, 7	5	☐
Laborer - Residential	621r	2, 7	5	☐
Mason-Building	3b-Co-Z2	8, 49, 51	2	☐
Mason-Building	3B-Z1	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Residential	3B-Z1R	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Building	3B-Bing-Z2	4, 9, 13, 39, 54		☐
Mason-Building	3B-lth-Z2	12, 55		☐
Mason-Building	3B-Jam-Z2	7	2, 5	☐
Mason-Residential	3B-Jam-Z2R	2, 4, 8, 7, 9, 12, 39, 13, 49, 51, 54, 55	5	☐
Mason-Building	3B-Z3	15, 32	5	☐
Mason-Building	3B-Z3.Orleans	37		☐
Mason-Residential	3B-Z3R	15, 32	5	☐
Mason-Residential	3B-Z3R.Orleans	37		☐
Mason-Heavy & Highway	3h	2, 4, 8, 7, 9, 12, 13, 19, 26, 28, 35, 37, 39, 49, 50, 51, 54, 55, 59, 61, 62	5, 15, 32	☐
Mason-Tile Finisher	3TF-Z1	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Tile Finisher	3TF-Z2	2, 4, 8, 7, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Finisher	3TF-Z3	15, 32, 37	5	☐
Mason-Tile Finisher-Residential	3TF-Z1R	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Tile Finisher-Residential	3TF-Z2R	2, 4, 7, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Finisher-Residential	3TF-Z3R	15, 32, 37	5	☐
Mason-Tile Setter	3TS-Z1	19, 26, 28, 35, 50, 59, 61, 62		☐

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Mason-Tile Setter Residential	3TS-Z1R	19, 26, 28, 35, 50, 59, 61, 62		☐
Mason-Tile Setter	3TS-Z2	2, 4, 7, 8, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Setter Residential	3TS-Z2R	2, 4, 7, 8, 9, 12, 13, 39, 49, 51, 54, 55	5	☐
Mason-Tile Setter	3TS-Z3	15, 32, 37	5	☐
Mason-Tile Setter Residential	3TS-Z3R	15, 32, 37	5	☐
Mason - Building/Heavy & Highway	780	3, 24, 30, 31, 41, 43, 52		☐
Operating Engineer - Heavy & Highway	137H/H	40, 60	14	☐
Operating Engineer - Heavy & Highway	832H	2, 8, 26, 28, 35, 49, 51, 59, 62	19	☐
Painter	150	28, 59, 62	26, 35	☐
Painter	178 B	4, 9, 54		☐
Painter	178 E	8, 49	51	☐
Painter	178 I	12, 55		☐
Painter	178 O	13, 39		☐
Painter	31	6, 22, 27, 33, 34, 50	25, 35, 38	☐
Painter	38.O		38	☐
Painter	38.W	23, 45	25	☐
Painter	4-Buf,Nia,Olean	2, 15, 19, 32, 37, 61	5, 7, 26, 51	☐
Painter	4-Jamestown		5, 7	☐
Sheetmetal Worker	46	26, 28, 35, 50, 59, 62		☐
Sheetmetal Worker	46r	26, 28, 35, 50, 59, 62		☐
Teamsters-Heavy & Highway	294h/h	1, 11, 18, 20, 29, 42, 46, 47, 48, 58	57	☐
Teamsters-Heavy & Highway	317bhh	6, 12, 50, 51, 55, 62	2	☐
Teamsters-Building/Heavy & Highway	456	40, 60		☐
				☐
				☐
				☐

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.

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. In most cases the payment or provision of supplements is for each hour worked (noted in the schedule as 'Per hour worked'). Some classifications require the payment or provision of supplements for each hour paid (noted in the schedule as 'Per hour paid'), which require supplements to be paid or provided at a premium rate for premium hours worked. Some classifications may also require the payment or provision of supplements for paid holidays on which no work is performed.

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.state.ny.us) 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 12240

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

10/01/2015

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: 07/01/2015

Boilermaker \$ 51.56

Repairs & Renovations \$ 51.56

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2015

Boilermaker 32% of hourly

Repairs & Renovations Wage Paid

+ \$25.19

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

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (8, 16, 23, 24) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 12, 15, 25) on HOLIDAY PAGE

NOTE: *Employee must work in pay week to receive Holiday Pay.

**Boilermaker gets 4 times the hourly wage rate for working on Labor Day.

***Repairs & Renovation see (B,E,Q) on HOLIDAY PAGE

HOLIDAY

REGISTERED APPRENTICES

Wage per hour:

(1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th	8th
65%	65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

07/01/2015

Apprentice(s) 32% of Hourly
Wage Paid Plus
Amount Below

1st Term \$ 19.27

2nd Term 20.11

3rd Term 20.95

4th Term 21.80

5th Term 22.65

6th Term 23.49

7th Term 24.33

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Carpenter

10/01/2015

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: 07/01/2015 10/17/2015

Core Drilling:		
Driller	\$ 36.82	+ Additional \$ 2.21
Driller Helper	\$ 29.44	+ Additional \$ 1.94

Additional Helpers: One (1) year increments. This is not an apprenticeship for Driller:

Helper 1st year	\$ 20.61
Helper 2nd year	23.55
Helper 3rd year	26.50
Helper 4th year	29.44

Note: Hazardous Waste Pay Differential:

For Level C, an additional 10% above wage rate per hour

For Level B, an additional 10% above wage rate per hour

For Level A, an additional 10% above wage rate per hour

Note: When required to work on water: an additional \$ 0.50 per hour.

SUPPLEMENTAL BENEFITS

Per hour paid: 07/01/2015 10/17/2015

Driller and All Helpers	\$ 22.79	\$ 22.79

OVERTIME PAY

OVERTIME: See (B,E,K*,P,R**) on OVERTIME PAGE.

HOLIDAY

Paid: See (5,6) on HOLIDAY PAGE.

Overtime: * See (5,6) on HOLIDAY PAGE.

** See (8,10,11,13) on HOLIDAY PAGE.

8-1536-CoreDriller

Carpenter

10/01/2015

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour: 07/01/2015

Timberman	\$ 45.60

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2015

\$ 47.05

OVERTIME PAY

See (B, E, E2, 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

Wages per hour:

(1) year terms:

1st	2nd	3rd	4th
\$18.24	\$22.80	\$29.64	\$36.48

Supplemental benefits per hour:

\$ 31.92

8-1556 Tm

Carpenter**10/01/2015**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2015

Building

Millwright

\$ 48.44

+ Additional

\$ 2.40

SUPPLEMENTAL BENEFITS

Per hour paid:

Millwright

\$ 50.49

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.

* must show up to work

REGISTERED APPRENTICES

Wages per hour is Percentage of Journeyworkers wage:

(1) year terms:

1st.	2nd.	3rd.	4th.
\$26.64	\$31.49	\$36.33	\$46.02

Supplemental benefits per hour paid:

(1) year terms:

1st.	2nd.	3rd.	4th.
\$32.81	\$36.15	\$40.63	\$46.21

8-740.1

Carpenter**10/01/2015**

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2015

Marine Construction:

Marine Diver

\$ 61.30

Marine Tender

43.45

SUPPLEMENTAL BENEFITS

Per Hour Paid:

Journeyman

\$ 46.09

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE
Overtime: See (5, 6, 10, 11, 13, 16, 18, 19) on HOLIDAY PAGE

8-1456MC

Carpenter**10/01/2015**

JOB DESCRIPTION Carpenter**DISTRICT 8****ENTIRE COUNTIES**

Bronx, Dutchess, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

PARTIAL COUNTIES

Orange: The area lying on Southern side of Orange County demarcated by a line drawn from the Bear Mountain Bridge continuing east to the Bear Mountain Circle, continue North on 9W to the town of Cornwall where County Road 107 (also known as Quaker Rd) crosses under 9W, then east on County Road 107 to Route 32, then north on Route 32 to Orrs Mills Rd, then west on Orrs Mills Rd to Route 94, continue west and south on Route 94 to the Town of Chester, to the intersection of Kings Highway, continue south on Kings Highway to Bellvale Rd, west on Bellvale Rd to Bellvale Lakes Rd, then south on Bellvale Lakes Rd to Kain Rd, southeast on Kain Rd to Route 17A, then north and southeast along Route 17A to Route 210, then follow Route 210 to NJ Border.

WAGES

Per hour: 07/01/2015

Carpet/Resilient

Floor Coverer \$ 49.88

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS

Per hour paid:

Floor Coverer \$ 44.07

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 is Percentage of Journeyworkers Wage

(1) year terms:

1st.	2nd.	3rd.	4th.
\$19.95	\$24.94	\$32.42	\$39.90

Supplemental benefits per hour:

\$ 30.22

8-2287

Carpenter**10/01/2015**

JOB DESCRIPTION Carpenter**DISTRICT 8****ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2015

Piledriver \$ 50.50

Dockbuilder \$ 50.50

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker \$ 47.03

OVERTIME PAY

See (B, E2, O) 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

Wages per hour

(1)year terms:

1st	2nd	3rd	4th
\$20.20	\$25.25	\$32.83	\$40.40

Supplemental benefits per hour:

Apprentices \$ 31.90

8-1556 Db

Carpenter - Building / Heavy&Highway

10/01/2015

JOB DESCRIPTION Carpenter - Building / Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

WAGES

WAGES:(per hour)

07/01/2015

BUILDING:

Carpenter \$ 44.47

HEAVY/HIGHWAY:

Carpenter \$ 44.47

Carpenter Concrete Forms \$ 44.47

SHIFT DIFFERENTIAL: When it is mandated by a Government Agency irregular or off shift can be worked. The Carpenter shall receive an additional fifteen(15) percent of wage plus applicable benefits.

NOTE:Carpenters employed in the abatement or removal of asbestos or any toxic or hazardous material or required to work near asbestos or any toxic or hazardous material and required to wear protective equipment shall receive two (2) hours extra pay per day, plus applicable supplemental benefits.

SUPPLEMENTAL BENEFITS

Per hour paid:

BUILDING AND HEAVY/HIGHWAY:

Journeyworker \$ 29.73

OVERTIME PAY

BUILDING:

See (B, E, E2, Q,) on OVERTIME PAGE.

HEAVY/HIGHWAY:

See (B, E, E2, Q*, T**) on OVERTIME PAGE.

HOLIDAY

BUILDING:

Paid: See (1) on HOLIDAY PAGE.

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE.

HEAVY/HIGHWAY:

Paid: See (5, 6, 16, 25) on HOLIDAY PAGE including benefits.

Overtime: See (5*, 6*, 16**, 25**) on HOLIDAY PAGE.

*NOTE: For Holidays 5 and 6 code T applies, with
benefits at straight time rate.

**NOTE: For Holidays 16 and 25 code Q applies, with
benefits at straight time rate.

REGISTERED APPRENTICES

(1)year terms at the following wage rates.

BUILDING-HEAVY/HIGHWAY:

1st	2nd	3rd	4th
\$21.83	\$25.49	\$29.14	\$32.80

Supplemental Benefits per hour paid:

Apprentices

All terms \$ 15.35

11-279.1B/HH

Electrician

10/01/2015

JOB DESCRIPTION Electrician

DISTRICT 8

ENTIRE COUNTIES

Westchester

WAGES

Per hour:

	07/01/2015	04/28/2016
Electrician/A-Technician	\$ 50.75	\$ 50.75
Teledata	\$ 50.75	\$ 50.75

* Note: All maintenance (TEMPORARY WORK ONLY) of feeders, sub-feeders and wiring of electrical equipment for HEATING OF BUILDINGS shall be paid for at 80% of the regular hourly rate for the first 40 hours. After 40 hours they shall be paid time and one-half.

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 worked:

	07/01/2015	04/28/2016
Journeyworker	\$ 42.43	\$ 43.70

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

Entering Program PRIOR to April 23, 2014

(1) year terms at the following wage rates:

	07/01/2015	04/28/2016
1st term	\$ 13.75	\$ 13.75
2nd term	16.55	16.55
3rd term	18.65	18.65
4th term	20.60	20.60
MIJ	26.00	26.00

Supplemental Benefits per hour worked:

	07/01/2015	04/28/2016
1st term	\$ 9.74	\$ 9.74
2nd term	13.18	13.18
3rd term	14.58	14.58
4th term	15.88	15.88
MIJ	13.26	13.26

Entering Program AFTER April 23, 2014
(1) year terms at the following wage rates:

	07/01/2015	04/28/2016
1st term	\$ 12.50	\$ 12.50
2nd term	14.50	14.50
3rd term	16.50	16.50
4th term	18.50	18.50
MIJ 1-12 months	22.50	22.50
MIJ 13-18 months	26.00	26.00

Supplemental Benefits per hour worked:

	07/01/2015	04/28/2016
1st term	\$ 8.88	\$ 8.88
2nd term	11.77	11.77
3rd term	13.10	13.10
4th term	14.43	14.43
MIJ 1-12 months	11.95	11.95
MIJ 13-18 months	13.26	13.26

8-3/W

Electrician

10/01/2015

JOB DESCRIPTION Electrician

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond, Westchester

WAGES

Per hour Paid:	07/01/2015	03/09/2016
Service Technician	\$ 31.40	\$ 32.00

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:	\$ 14.76	\$ 15.47

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

9-3H

Electrician

10/01/2015

JOB DESCRIPTION Electrician

DISTRICT 8

ENTIRE COUNTIES

Westchester

WAGES

Entering Program PRIOR to April 23, 2014

	07/01/2015	04/28/2016
Electrician	\$ 26.00	\$ 26.00
H - Telephone	\$ 26.00	\$ 26.00

Entering Program AFTER April 23, 2014

	07/01/2015	04/28/2016
Electrician	\$ 22.50	\$ 22.50
H - Telephone	\$ 22.50	\$ 22.50

Electrical and Teledata work of limited scope, consisting of repairs and /or replacement of electrical and teledata equipment.

- Includes all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls and washing and cleaning of foregoing fixtures.

See Electrician/A Technician classification for all new installations of wiring, conduit, junction boxes and light fixtures.

SUPPLEMENTAL BENEFITS

Entering Program PRIOR to April 23, 2014

	07/01/2015	04/28/2016
Electrician & H - Telephone	\$ 13.26	\$ 13.26

Entering Program AFTER April 23, 2014

	07/01/2015	04/28/2016
Electrician & H - Telephone	\$ 11.95	\$ 11.95

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

8-3m

Elevator Constructor

10/01/2015

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	07/01/2015	01/01/2016
		Additional
Mechanic	\$ 52.51	\$2.80
Helper	70% of Mechanic Wage Rate	

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30R; additionally, there must be a dispensation of hours in place on the project.

SUPPLEMENTAL BENEFITS

Per hour worked

	07/01/2015
Journeyman/Helper	\$ 28.385*

(*)Plus 6% of gross wages if less than 5 years service

(*)Plus 8% of gross wages if more than 5 years 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 %

*No supplemental benefits

Supplemental Benefits per hour worked:

Same as Journeyman/Helper

1-138

Elevator Constructor

10/01/2015

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:

	07/01/2015	03/17/2016
Elevator Constructor	\$ 59.55	\$ 60.96
Modernization & Service/Repair	46.92	47.91

SUPPLEMENTAL BENEFITS

Per Hour:

Elevator Constructor	\$ 35.17	\$ 36.86
Modernization & Service/Repair	34.21	35.87

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 Term is based on Average wage of Constructor & Modernization.

Terms 2 thru 4 Based on Journeyman's wage of classification Working in.

1 YEAR TERMS:

1st Term*	2nd Term	3rd Term	4th Term
50%	55%	65%	75%

SUPPLEMENTAL BENEFITS

Elevator Constructor		
1st Term	\$ 28.93	\$ 30.44
2nd Term	29.73	31.27
3rd Term	30.94	32.51
4th Term	32.15	33.75

Modernization &
Service/Repair

1st Term	\$ 28.85	\$ 30.37
2nd Term	29.21	30.73
3rd Term	30.32	31.87
4th Term	31.43	33.02

Glazier **10/01/2015**

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:	07/01/2015	11/01/2015	05/01/2016
Glazier	\$ 52.20*	\$ 52.80*	+Additional \$ 1.50
Scaffolding	\$ 53.20*	\$ 53.80*	+Additional \$ 1.50

Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 24' or more, but not pipe scaffolding.

Repair & Maintenance \$ 27.30*

Repair & Maintenance- All repair & maintenance work on a particular building, whenever performed, where the total cumulative contract value is under \$121,550

*Additional \$.05 per hour for all regular hours worked

SUPPLEMENTAL BENEFITS

Per hour paid:	07/01/2015	11/01/2015
Journeyworker	\$ 28.04	\$ 28.29
Repair & Maintenance	16.14	16.14

OVERTIME PAY

OVERTIME: Premium is applied to the respective base wage only.
See (C*, D*, E2, O) on OVERTIME PAGE.

* If an optional 8th hour is required to complete the entire project, the same shall be paid at the regular rate of pay. If a 9th hour is worked, then both hours or more (8th & 9th or more) will be paid at double time rate of pay.

For Repair & Maintenance see (B, B2, F, P) on overtime page.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE
Paid for the Repair & Maintenance (5, 6, 16 & 25)

REGISTERED APPRENTICES

Wage per hour:

(1) year terms at the following wage rates:

	07/01/2015	11/01/2015
1st term	\$ 17.70	\$ 17.95
2nd term	25.85	26.20
3rd term	31.19	31.54
4th term	41.71	42.14

Supplemental Benefits:

(Per hour worked)

1st term	\$ 13.84	\$ 13.99
2nd term	19.10	19.26
3rd term	20.97	21.13
4th term	24.32	24.57

8-1281 (DC9 NYC)

Insulator - Heat & Frost **10/01/2015**

JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Westchester

WAGES

Per hour: 07/01/2015
Insulator \$ 48.45

Discomfort & \$ 49.63
Additional Training**

Fire Stop Work* \$ 25.44

* 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 paid)
Journeyworker \$ 31.40

Discomfort & \$ 32.20
Additional Training

Fire Stop Work:
Journeyworker \$ 16.06

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
\$ 20.84	\$ 25.44	\$ 34.64	\$ 39.25

Discomfort & Additional Training Apprentices:

1st	2nd	3rd	4th
\$ 21.28	\$ 26.00	\$ 35.44	\$ 40.17

Supplemental Benefits paid per hour paid:

Insulator Apprentices:

1st term	\$ 12.98
2nd term	16.06
3rd term	22.20
4th term	25.27

Discomfort & Additional Training Apprentices:

1st term	\$ 13.29
2nd term	16.44
3rd term	22.75
4th term	25.90

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: 07/01/2015

Reinforcing &
Metal Lathing \$ 53.63

SUPPLEMENTAL BENEFITS

Per hour paid:

Reinforcing &
Metal Lathing \$ 31.95

OVERTIME PAY

See (B, B1, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 13, 18, 19, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following wage rates:

Wages Per Hour:

1st term	2nd term	3rd term
\$ 23.01	\$ 28.11	\$ 33.21

SUPPLEMENTAL BENEFITS

Per Hour:

1st term	2nd term	3rd term
\$ 18.18	\$ 18.18	\$ 18.18

4-46Reinf

Ironworker

10/01/2015

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2015 01/01/2016

Ornamental	\$ 43.20	\$ 1.25/Hr
Chain Link Fence	43.20	Additional
Guide Rail Installation	43.20	

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker: \$ 48.16

OVERTIME PAY

OVERTIME: See (A*,D1,E**,Q,V) on OVERTIME PAGE.

*Time and one-half shall be paid for all work in excess of seven (7) hours at the end of a work day to a maximum of two (2) hours on any regular work day (8th & 9th hours of work) and double time shall be paid for all work thereafter.

**Time and one-half shall be paid for all work on Saturday up to seven (7) hours and double time shall be paid for all work thereafter.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

1st term represents first 1-10 months, thereafter (1/2) year terms at the following percentage of Journeyman's wage.

1st	2nd	3rd	4th	5th
50%	55%	60%	70%	80%

Supplemental Benefits per hour paid:

1st Term	\$ 36.97
2nd Term	38.10
3rd Term	39.22
4th Term	41.46
5th Term	43.69

4-580-Or

Ironworker**10/01/2015****JOB DESCRIPTION** Ironworker**DISTRICT** 9**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour: 07/01/2015 01/01/2016

IRONWORKER:

Ironworker Rigger \$ 56.09 An Additional \$ 1.36

Ironworker Stone
Derrickman \$ 56.09 \$ 1.36

SUPPLEMENTAL BENEFITS

Ironworker: \$ 38.37

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 (1) 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:

1/2 year terms at the following hourly wage rate:

	1st	2nd	3rd	4th	5th	6th
07/01/2015	\$28.05	\$28.05	\$39.26	\$44.87	\$50.48	\$50.48

Supplemental benefits:

Per hour paid:	\$19.19	\$19.19	\$28.78	\$28.78	\$28.78	\$28.78

9-197D/R

Ironworker**10/01/2015****JOB DESCRIPTION** Ironworker**DISTRICT** 4**ENTIRE COUNTIES**

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

PER HOUR: 07/01/2015

Ironworker:
Structural \$ 48.75
Bridges
Machinery

SUPPLEMENTAL BENEFITS

PER HOUR:

Journeyman \$ 67.83

OVERTIME PAY

See (B*,E**,Q,V) on OVERTIME PAGE.

* Time and one-half shall be paid for all work in excess of (8) eight hours at the end of a work day to a maximum of two hours on any regular work day (the ninth (9th) and tenth (10th) hours of work)and double time shall be paid for all work thereafter.

** 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.

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	\$ 25.48
2nd	26.08
3rd - 6th	26.68

Supplemental Benefits

PER HOUR:

All Terms 47.32

4-40/361-Str

Laborer - Building

10/01/2015

JOB DESCRIPTION Laborer - Building

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

	07/01/2015	05/01/2016
Laborer	\$ 36.55	+ Additional \$ 1.65
Laborer-Asbestos & Hazardous Materials Removal	\$ 38.20*	+ Additional \$ 1.65

* 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.

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 worked)

Journeyworker \$ 23.75

OVERTIME PAY

OVERTIME:..... 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	Level B	Level C	Level D	Level E
0-1000	1001-2000	2001-3000	3001-4000	4001+
\$ 21.35	\$ 25.12	\$ 28.40	\$ 33.80	\$ 36.55

Supplemental Benefits per hour worked:

Apprentices

Level A	\$ 11.65
Level B	13.90
Level C	16.65
Level D	16.80
Level E	23.75

8-235/B

Laborer - Heavy&Highway

10/01/2015

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 and Quarry Master

GROUP II: Burner, Drillers(jumbo, joy, wagon, air track, hydraulic), Drill Operator, Self Contained Rotary Drill, Curbs/ Asphalt Screedman/Raker, Bar Person.

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.

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

WAGES: (per hour)	07/01/2015	04/01/2016 + Additional \$ 1.50
GROUP I	\$ 39.20	
GROUP II	37.85	
GROUP III	37.45	
GROUP IV	37.10	
GROUP V	36.75	
GROUP VIA	38.75	
Gas Mechanic	44.20	
Flagperson	30.40	

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 Paid	\$ 20.00
Over 40 Hours	
Per Hour Worked	15.20

OVERTIME PAY

See (B, E, P, R, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 9, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 9, 15, 25) on HOLIDAY PAGE

NOTE: For 'Holiday Paid: 5,6,8,9,15,25

For 'Holiday Overtime: 5,6 Code 'S' applies
For 'Holiday Overtime: 8,9,15,25' Code 'R' applies

REGISTERED APPRENTICES

ENROLLED ON OR BEFORE MARCH 31, 2014

1st term	1st term	2nd term	3rd term	4th term
1-499hrs	500-1000hrs	1001-2000hrs	2001-3000hrs	3001-4000hrs
\$ 20.21	\$ 20.21	\$ 24.44	\$ 28.21	\$ 31.89

Supplemental Benefits per hour worked:

1st term	None
1st term(500-1000hrs)	\$ 2.85
2nd term	3.85
3rd term	4.85
4th term	5.60

ENROLLED ON OR AFTER APRIL 1, 2014

1st term	2nd term	3rd term	4th term
1-1000hrs	1001-2000hrs	2001-3000hrs	3001-4000hrs
\$ 21.01	\$ 24.79	\$ 28.56	\$ 32.24

Supplemental Benefits per hour worked:

1st term	\$ 3.85
2nd term	3.95
3rd term	4.45
4th term	5.00

8-60H/H

Laborer - Tunnel

10/01/2015

JOB DESCRIPTION Laborer - Tunnel

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

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

WAGES:(per hour) 07/01/2015

Class 1	\$ 44.15
Class 2	\$ 46.15
Class 4	\$ 52.15

SHIFT WORK:When mandated by the contracting agency, 2nd and 3rd shifts, and irregular shift work shall be paid at time and one half the regular rate, Monday through Friday. Saturday shall be 1.65 times the regular rate.Sunday shall be paid at 2.15 times the regular rate.
Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional \$ 3.00 an hour.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:

Straight time:	\$ 25.75
Premium time:	\$ 38.63
Shift work	
Irregular shifts	
Saturday, Sunday	
Holidays	

OVERTIME PAY

See (B, E, Q, *S, V) on OVERTIME PAGE

*Work on a holiday which falls on a Saturday

HOLIDAY

Paid: See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 15, *16, 25) on HOLIDAY PAGE

* Double rate and benefits if worked

REGISTERED APPRENTICES

SEE HEAVY/HIGHWAY CLASSIFICATION FOR APPRENTICE RATES

8-60Tun

Lineman Electrician

10/01/2015

JOB DESCRIPTION Lineman Electrician

DISTRICT 6

ENTIRE COUNTIES

Westchester

WAGES

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)

Includes Teledata Work performed within ten (10) feet of high voltage (600 volts or over) transmission lines.

Per hour:	07/01/2015	05/02/2016
		Additional
Lineman, Tech, Welder	\$ 49.41	\$ 2.50
Crane, Crawler Backhoe	49.41	2.50
Cable Splicer-Pipe Type	54.35	2.50
Digging Mach Operator	44.47	2.50
Cert. Welder-Pipe Type	51.88	2.50
Tractor Trailer Driver	42.00	2.50
Groundman, Truck Driver	39.53	2.50
Mechanic 1st Class	39.53	2.50
Flagman	29.65	2.50

Additional \$1.00 per hour for entire crew when a helicopter is used.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING 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%

** IMPORTANT NOTICE **

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.

*Effective 05/06/2013, Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30R; additionally, there must be a dispensation of hours in place on the project.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

Journeyman	\$ 20.50
	*plus 7% of hourly wage

*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.

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.

1st	2nd	3rd	4th	5th	6th	7th
\$ 29.65	\$ 32.12	\$ 34.59	\$ 37.06	\$ 39.53	\$ 42.00	\$ 44.47

SUPPLEMENTAL BENEFITS: Same as Journeyman

6-1249aWest

Lineman Electrician - Teledata

10/01/2015

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.

	07/01/2015	01/01/2016	01/01/2017
Cable Splicer	\$ 29.70	\$ 30.29	\$ 30.90
Installer, Repairman	28.19	28.75	29.33
Teledata Lineman	28.19	28.75	29.33
Technician, Equipment Operator	28.19	28.75	29.33
Groundman	14.95	15.25	15.56

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work please see LINEMAN.

SUPPLEMENTAL BENEFITS

Per hour worked:

Journeyman	\$ 4.43	\$ 4.43	\$ 4.43
	*plus 3% of wage paid	*plus 3% of wage paid	*plus 3% of 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

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal Lighting

10/01/2015

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, chain saws, 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 ground man/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:	07/01/2015	05/02/2016
		Additional
Lineman, Technician	\$ 45.97	\$ 2.00
Crane, Crawler Backhoe	45.97	2.00
Certified Welder	48.27	2.00
Digging Machine	41.37	2.00
Tractor Trailer Driver	39.07	2.00
Groundman Truck Driver	36.78	2.00
Mechanic 1st Class	36.78	2.00
Flagman	27.58	2.00

Above rates applicable on all Lighting and Traffic Signal Systems with the installation, testing, operation, maintenance and repair of all traffic control and illumination projects, traffic monitoring systems, road weather information systems, and the installation of Fiber Optic Cable.

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%

**** IMPORTANT NOTICE ****

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.

*Effective 05/06/2013, Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30R; additionally, there must be a dispensation of hours in place on the project.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

Journeyman	\$ 20.50
	*plus 7% of hourly wage

*The 7% is based on the hourly wage paid, straight time rate or premium rate.

Supplements paid at STRAIGHT TIME rate for holidays.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE. *Note* Double time for emergency work designated by the Dept. of Jurisdiction.

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.

1st	2nd	3rd	4th	5th	6th	7th
\$ 27.58	\$ 29.88	\$ 32.18	\$ 34.48	\$ 36.78	\$ 39.07	\$ 41.37

SUPPLEMENTAL BENEFITS: Same as Journeyman

6-1249aWestLT

Mason - Building

10/01/2015

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2015	12/07/2015 Additional
Building:		
Tile Setters	\$ 54.31	\$ 1.13

SUPPLEMENTAL BENEFITS

Per Hour:

Journey Worker \$23.68* plus \$2.90

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

* This portion of benefits subject to same premium rate as shown for overtime wages.

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:

Tile Setters:

(750 hour) term at the following wage rate:

Term:	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	1-	751-	1501-	2251-	3001-	3751-	4501-	5251	6001-	6750-
	750	1500	2250	3000	3750	4500	5250	6000	6750	7500
	\$27.45	\$30.71	\$34.96	\$39.98	\$41.99	\$44.96	\$46.70	\$50.45	\$52.61	\$53.58

Supplemental Benefits per hour:

1st term	\$14.70* plus \$0.72	6th term	\$17.85* plus \$1.51
2nd term	\$15.70* plus \$0.76	7th term	\$16.10* plus \$5.81
3rd term	\$15.70* plus \$0.80	8th term	\$16.60* plus \$5.85
4th term	\$16.60* plus \$1.17	9th term	\$18.35* plus \$6.22
5th term	\$16.85* plus \$1.19	10th term	\$21.62* plus \$6.27

9-7/52A

Mason - Building

10/01/2015

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Wages:	07/01/2015	01/01/2016
Marble Cutters& Setters	\$ 56.53	\$ 56.89

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 31.17 \$ 32.06

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:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-	751-	1501-	2251-	3001-	3751-	4501-	5251-	6001-	6751-

750	1500	2250	3000	3750	4500	5250	6000	6751	7500
\$22.61	\$25.44	\$28.27	\$31.09	\$33.92	\$36.74	\$39.57	\$42.40	\$48.05	\$53.70

Supplemental Benefits per hour paid at the following term:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$22.87	\$23.55	\$24.26	\$24.95	\$25.63	\$26.32	\$27.03	\$27.72	\$29.09	\$30.48

9-7/4

Mason - Building	10/01/2015

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2015 01/01/2016

Building-Marble Restoration: An Additional

Marble, Stone & Terrazzo Polisher, etc	\$ 39.50	\$ 0.75

SUPPLEMENTAL BENEFITS

Per Hour Paid:

Journeyworker:

Building-Marble Restoration:

Marble, Stone & Polisher	\$ 23.88

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)terms at the following wages:

	1st 0-900	2nd 901-1800	3rd 1801-2700	4th over 2700
07/01/2015	\$ 27.48	\$ 31.40	\$35.33	\$ 39.25

Supplemental Benefits Per Hour:

07/01/2015	\$ 21.49	\$ 22.12	\$ 22.75	\$ 23.38

9-7/24-MP

Mason - Building	10/01/2015

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Building: 07/01/2015 01/01/2016

Wages per hour: An Additional

Mosaic & Terrazzo Mechanic	\$ 50.71	\$ 1.15

Mosaic & Terrazzo Finisher \$ 49.10 \$ 1.15

SUPPLEMENTAL BENEFITS

Journeyworker:
Per hour:

Mosaic & Terrazzo Mechanic \$ 32.36

Mosaic & Terrazzo Finisher \$ 32.35

OVERTIME PAY

See (A, *E, Q) on OVERTIME PAGE

Double the rate after 10 hours on Saturday

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:

(750 Hour) terms at the following wage rate.

1st	2nd	3rd	4th	5th	6th	7th	8th
\$25.35	27.87	30.42	32.94	35.49	38.02	43.08	48.16

Supplemental benefits per hour:

16.19	17.81	19.42	21.05	22.66	24.28	27.52	30.75

9-7/3

Mason - Building

10/01/2015

JOB DESCRIPTION Mason - Building

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:

07/01/2015

06/01/2016

Bricklayer	\$ 39.93	\$ 40.68
Cement Mason Bldg*	39.93	\$ 40.68
Plasterer/Stone Mason	39.93	\$ 40.68
Pointer/Caulker	39.93	\$ 40.68

Additional \$1.00 per hour for power saw work

Additional \$0.50 per hour for swing scaffold or staging work

SHIFT DIFFERENTIAL: When shift work is mandated or required by state, federal, county, local or other governmental contracts, the following rates apply:

Second shift an additional 15% of wage plus benefits to be paid

Third shift an additional 25% of wage plus benefits to be paid

* Overtime paid at one and one half wage and benefits

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyman \$ 30.91 \$ 32.11

OVERTIME PAY

OVERTIME:

Cement Mason See (B, E2, H, V) on OVERTIME PAGE.

All Others See (B, E, E2, Q) on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

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 paid

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 September 1 2009 receive full journeyman benefits

11-5wp-b

Mason - Building	10/01/2015

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2015 12/07/2015 06/06/2016

Buidling: An Additional
Tile Finisher \$41.98 \$0.82 An Additional \$0.82

SUPPLEMENTAL BENEFITS

Per Hour:

Journey worker \$ 21.02* plus \$ 6.89

OVERTIME PAY

See (B, E, Q, *V) on OVERTIME PAGE

* This portion of Supplemental benefits subject to same premium rate as shown for overtime wages.

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	10/01/2015

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2015 01/01/2016

Marble, Stone, etc.
Maintenance Finishers: \$ 21.57 \$ 21.76

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, etc
Maintenance Finishers: \$ 12.20 \$ 12.41

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:

(750 hour)terms at the 07/01/2015
following percentage
of journeyman's wage
rate:

1st term	0-750	70%
2nd term	750-1500	74%
3rd term	1501-2250	78%
4th term	2251-3000	82%
5th term	3001-3750	88%
6th term	3751-4500	96%

Supplemental Benefits:

Per hour paid

1st term	\$ 11.92
2nd term	11.93
3rd term	11.94
4th term	11.95
5th term	11.96
6th term	11.98

9-7/24M-MF

Mason - Building / Heavy&Highway

10/01/2015

JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2015	01/01/2016
		An Additional
Marble-Finisher	\$ 45.08	\$ 0.90

SUPPLEMENTAL BENEFITS

Journeyworker:
per hour paid

Marble- Finisher	\$ 30.41

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

* Work beyond 8 hours on a Saturday shall be paid at double the rate.

** When an observed holiday falls on a Sunday, it will be observed the next day.

9-7/20-MF

Mason - Heavy&Highway

10/01/2015

JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:	07/01/2015	06/01/2016
Bricklayer	\$ 40.43	\$ 41.18

Cement Mason*	40.43	\$ 41.18
Marble/Stone Mason	40.43	\$ 41.18
Plasterer	40.43	\$ 41.18
Pointer/Caulker	40.43	\$ 41.18

Additional \$1.00 per hour for power saw work
Additional \$0.50 per hour for swing scaffold or staging work

SHIFT DIFFERENTIAL: When shift work is mandated or required by state, federal, county, local or other governmental contracts, the following rates apply:

Second shift an additional 15% of wage plus benefits to be paid
Third shift an additional 25% of wage plus benefits to be paid

* Overtime paid at one and one half times wage and benefits

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyman	\$ 30.91	\$ 32.11

OVERTIME PAY

See (B, O) on OVERTIME PAGE

*Cement Mason See (B, H, V)

HOLIDAY

Paid: See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 25) on HOLIDAY PAGE

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 paid

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 September 1, 2009 receive full journeyman benefits

11-5WP-H/H

Operating Engineer - Building

10/01/2015

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, Clamshell Crane, Derrick, 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), Conventional and Hydraulic.

Cranes (All types 100 tons and over), Tower, Climbing, Conventional, Hydraulic.

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, Maintenance Engineer, 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: Bulldozer D6 and Under, 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, Concrete Buggy (One yard and up, Ride on dumper, Benford or Similar) Fire Watchman, 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, Lighting Unit (Portable & Generator), 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 (Under 125 cu. Feet), Heater (All Types), Lighting Unit (Portable & Generator) Pump, Pump Station (Water, Sewer, Portable, Temporary), Steam Jenny, Sweeper, Chipper, Mulcher, Welding Machine (Steel Erection & Excavation)

GROUP V: Crane Operator in Training (65 Tons to 100 Tons), Mechanics Helper, Motorized Roller (walk behind), Stock Attendant, Welder's Helper.

GROUP VI-A: Welder, Certified.

GROUP VI-B: Utility Man, Warehouse Man.

WAGES: (per hour)

	07/01/2015	03/07/2016	03/06/2017
GROUP I			
Cranes- up to 49 tons	\$ 58.32	\$ 59.76	\$ 61.65
Cranes- 50 tons to 99 tons	60.37	61.86	63.81
Cranes- 100 tons and over	69.01	70.71	72.94
GROUP I-A	50.98	52.23	53.90
GROUP I-B	46.93	48.09	49.63
GROUP II	49.16	50.37	51.98
GROUP III-A	47.34	48.50	50.06
GROUP III-B	45.03	46.14	47.62
GROUP IV-A	46.85	48.01	49.55
GROUP IV-B	39.52	40.49	41.80
GROUP V	42.66	43.70	45.12
GROUP VI-A	50.04	51.27	52.91
GROUP VI-B			
Utility Man	40.44	41.43	42.78
Warehouse Man	42.42	43.46	44.87

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:

	07/01/2015	03/07/2016	03/06/2017

Journeyworker	\$ 19.14	\$ 19.75	\$ 20.50
	Per hour paid	Per hour paid	Per hour paid
	+ \$8.02	+ \$8.02	+ \$8.02
	Per hour worked	Per hour worked	Per hour worked

OVERTIME PAY

OVERTIME:..... See (B, E,P,R*,U**,V) on OVERTIME PAGE.

HOLIDAY

HOLIDAY:

Paid:..... See (5, 6, 11, 12, 15, 25) on HOLIDAY PAGE.

Overtime:..... See (5, 6, 11, 12, 15, 25) on HOLIDAY PAGE.

* For Holiday codes 11, 12, 15, 25, 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.

8-137B

Operating Engineer - Building

10/01/2015

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)	07/01/2015	07/01/2016 An Additional
Building Construction:		
Party Chief	\$ 66.52	\$ 2.64
Instrument Man	\$ 52.95	\$ 2.25
Rodman	\$ 36.24	\$ 1.78
Steel Erection:		
Party Chief	\$ 67.76	\$ 2.52
Instrument Man	\$ 54.07	\$ 2.16
Rodman	\$ 38.11	\$ 1.73

Heavy Construction-NYC counties only:
(Foundation, Excavation.)

Party Chief	\$ 72.18	\$ 2.80
Instrument man	\$ 54.57	\$ 2.30
Rodman	\$ 46.74	\$ 2.08

SUPPLEMENTAL BENEFITS

Per Hour:	07/01/2015
Steel Erection Only	\$ 19.80* + 6.65

All Other Classifications	\$ 20.05* + 6.65

* This portion subject to same premium as wages

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, 8, 11, 12, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 12, 25) on HOLIDAY PAGE

Operating Engineer - Heavy&Highway

10/01/2015

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

Catogories cover GPS & Underground Surveying

Per Hour:	07/01/2015	07/01/2016
		An Additional
Party Chief	\$ 69.72	\$ 2.73
Instrument Man	52.61	2.24
Rodman	44.96	2.10

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2015

All Catogories

Straight Time: \$ 26.70

Premium:

Time & 1/2 \$ 36.73

Double Time

\$ 46.75

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

10/01/2015

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,Rough Terrain Crane.

GROUP I-A: Auger, Auto Grader, Dynahoe and Dual purpose and similar machines, Barber Green Loader-Euclid Loader or similar type machine, boat captain, boring machine(all types), Bulldozer-All Sizes, Central Mix Plant Operator, Cherry Picker(Cableway)-Hydraulic, chipper (all types), close circuit t.v., Compactor with Blade,Concrete Portable Hoist, C.M.I. or Similar, Conway or Similar Mucking Machines, Gradall, Shovel Backhoe, etc. Grader, Derrick (Stone-Steel) Elevator & Cage, Front End Loaders over 1 1/2yds Hoist Single, Double, Triple Drum, Hoist Portable Mobile Unit, Hoist Engineer Concrete(Crane-Derrick-Mine Hoist), Hoist Engineer-Material, Hydraulic Boom, Letourneau or Tournapull (Scrapers over 20 yds struck), Mucking Machines, Overhead Crane, Paver (concrete) Pulsemeter, Push Button (Buss Box) Elevator, Road Mix Machines, Ross Carrier and similar, Shovels (Tunnels), SideBoom, Spreader (asphalt), Scoopmobile-Tractor-Shovel over 1 1/2 yards, Trenching Machines, Telephies-Vermeer Concrete Saw Trencher and/or Similar, Tractor type Demolition Equipment, Whirly,P-811 Track Renewal Machine-Similiar, certified Welder, Excavator (and all attachments).

GROUP I-B: Asphalt Mobile Conveyor/Transfer Machine, Road Paver-Asphalt.

GROUP II-A: Balast regulators, Compactor Self Propelled, Cow Tracks, Fusion Machine, Rail Anchor Machines, Scrapers-20 yds truck and under, Switchtampers, Vibratory Roller, etc., Roller 4 ton and over, Welder.

GROUP II-B: Mechanic (Outside) All Types.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler (High Pressure), Concrete Breaker, Concrete Pump, Concrete Spreader, Farm Tractor (All Types), Forklift (All), Gas Tapping(Live),Hydroseeder, Loader 1 1/2 yards and under, Locomotive(All Sizes), Machine Pulling Sheep's Foot Roller, Portable Plant, Portable Batch Plant, Portable Crusher, Powerhouse Plant, Roller (Under 4 ton), Stone Crusher, Sweeper, Turbo JetBurner or Similar, Sheer Excavator, Skid Steer/Bobcat, Well Drilling Machine.

GROUP IV-A: Service Person (Grease Truck).

GROUP IV-B: Conveyor Belt Machine, Heater all types, Lighting Unit (Portable & Generator), Mechanic's Helper, Pilot/Assistant Engineer/2 seated, Pumps-Pump Station-Water-Sewer-Gypsum-Plaster, etc., Pump Truck(Sewer Jet or Similar), Stock Room Attendant, Welding Machine Steel Erection Excavation), Well Point System, Welder's Helper,

GROUP V-A: Engineer-All Tower Cranes-All Climbing Cranes and all cranes of 100 ton capacity or greater(3900 Manitowac or similar), Hoist Engineer(Steel), Engineer-Pile Driver, Welder-Certified, Jersey Spreader, Pavement Breaker(Air Ram), Post Hole Digger.

WAGES: (per hour)

	07/01/2015	03/07/2016
Group I	\$ 55.61	\$ 57.28
Group I-A	49.12	50.62
Group I-B	51.71	53.28
Group II-A	47.07	48.51
Group II-B	48.52	50.00
Group III	46.26	47.68
Group IV-A	42.12	43.42
Group IV-B	36.28	37.42
Group V-A		
Engineer All Tower,Climbing and Cranes of 100 Tons	62.88	64.76
Hoist Engineer(Steel)	57.02	58.74
Engineer(Pile Driver)	60.75	62.57
Jersey Spreader,Pavement Breaker. (Air Ram)Post Hole Digger	48.14	49.62

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.

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.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30R; additionally, there must be a dispensation of hours in place on the project.

SUPPLEMENTAL BENEFITS

(per hour)

Journeyman:	07/01/2015	03/07/2016
	\$18.18 on all hours paid	\$18.75 all hours paid
	PLUS \$8.00 for first 40 hours worked	PLUS \$8.00 for first 40 hours worked
	PLUS \$1.00 on	PLUS \$1.00 on

all hours worked

all hours worked

OVERTIME PAY

See (B, E, E2, P, *R, **U) on OVERTIME PAGE

HOLIDAY

Paid:..... See (5, 6, 8, 9, 15, 25) on HOLIDAY PAGE

Overtime..... See (5, 6, 8, 9, 15, 25) on OVERTIME PAGE

* For Holiday codes 8,9,15,25 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.

	07/01/2015	03/07/2016
1st term	\$ 23.10	\$ 23.81
2nd term	27.73	28.58
3rd term	32.36	33.36
4th term	36.99	38.13

Supplemental Benefits per hour:

Apprentices:	07/01/2015	03/07/2016
	\$ 18.14 on all hours paid PLUS \$1.00 on all hours worked	\$ 18.75 on all hours paid PLUS \$1.00 on all hours worked

8-137HH

Operating Engineer - Heavy&Highway - Tunnel

10/01/2015

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, Auto Grader, Dynahoe & Dual purpose & similar machines, Barber Green Loader-Euclid Loader or similar type machine, Boat Captain, Boring Machine(all types), Bull Dozer-all types, Central Mix Plant Operator, Cherry Picker(Cableway or hydraulic), Chipper-all types, Close Circuit T.V., Compactor with Blade, Concrete Portable Hoist, C.M.I. or similar, Conway or similar Mucking Machine, Crane(Crawler or Truck) dragline, Gradall, Shovel Backhoe, etc. Grader, Derrick(Stone-Steel), Elevator & Cage(materials or passengers), Front End Loaders over 1 1/2 yards, Hoist Single, Double, Triple Drum, Hoist Portable Mobile Unit, Hoist Engineer-Concrete(Crane-Derrick-Mine Hoist), Hoist Engineer-Material, Hydraulic Boom, Letourneau or Tournapull(Scrapers over 20 yards struck), Log Skidder, Milling Machine, Moveable Concrete Barrier Transfer & Transport Vehicle, Mucking Machines. Overhead Crane, Paver(concrete), Pulsemeter, Push Button(Buzz Box)Elevator, Raise Boring Machine, Road Mix Machines. Robot Hammer(Brock or similar), Robotic EquipmentRoss Carrier and similar machines, Shovels(Tunnels), Side Boom, Slip Form Machine, Spreader(Asphalt), Scoopmobile-Tractor-Shovel over 1 1/2 yards, Trenching Machines, Telephies-Vermeer Concrete Saw Trencher and/or similar, Tractor type demolition equipment, Whirly.

GROUP I-B: Road Paver(Asphalt).

GROUP II-A: Balast Regulators, Compactor Self-propelled, Cow Tracks, Fusion Machine, Rail Anchor Machines, Roller 4 ton and over, Scrapers (20 yard struck and under), Switch Tampers, Vibratory Roller, etc., Welder.

GROUP II-B: Mechanic(outside) all types.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler (High Pressure), Concrete Breaker, Concrete Pump, Concrete Spreader, Curb Cutter Machine, Farm Tractor(all types), Finishing Machine(Concrete) Fine Grading Machine, Firemen, Forklift(ALL), John Henry Drill or similar, Joy Drill or similar Tractor Drilling Machine, Loader 1 1/2 yards and under, Locomotive(all sizes), Maintenance Engineer, Machine Pulling Sheeps Foot Roller, Material Hopper, Mixer Concrete(21-E & over), Mulching Grass Spreader, Portable Asphalt Plant, Portable Batch Plant, Portable Crusher, Powerhouse Plant, Quarry Master, Roller under 4 ton, Spreading and Fine Grading Machine, Steel Cutting Machine, Stone Crusher, Sweeper, Turbo Jet Burner or similar, Well Drilling Machine, Winch Truck "A" Frame.

GROUP IV-A: Service Person(Fuel Truck), Service Person(Grease Truck).

GROUP IV-B: Bending Machine, Compressor-Compressor Plant-Paint, Compressor-Steel Erection, Compressor Truck Mounted(2-6), Conveyor Belt Machine, Dust Collector, Heater(all types), Lighting Unit(portable & generator), Mixer Concrete under 21-E, Pilot/Assistant Engineer/2 seated, Pumps-Pump Station-Water-Sewer-Gypsum-Plaster, etc., Pump Truck(Sewer Jet or similar), Roller Motorized(Walk behind), Steam Jenny, Stock Room Attendant, Syphon Pump-Air-Stream, Tar Joint Machine, Vibrator(1 to 5), Welding Machine, 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)

	07/01/2015	03/07/2016
GROUP I	\$ 55.61	\$ 57.28
GROUP I-A	49.12	50.62
GROUP I-B	51.71	53.28
GROUP II-A	47.07	48.51
GROUP II-B	48.52	50.00
GROUP III	46.26	47.73
GROUP IV-A	42.12	43.42
GROUP IV-B	36.28	37.42
GROUP V-A		
Engineer-Cranes	62.88	64.76
Engineer-Pile Driver	60.75	62.57
Hoist Engineer	57.02	58.74
Jersey Spreader	48.14	49.62
Pavement Breaker	48.14	49.62
Post Hole Digger	48.14	49.62

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:

07/01/2015	03/07/2016
\$ 18.14 on all	\$ 18.75 on all
hours paid	hours paid
PLUS \$8.00 limited	PLUS \$8.00 limited
to first 40	to first 40
hours worked	hours worked
PLUS \$1.00 for all	PLUS \$1.00 for all
hours worked	hours worked

OVERTIME PAY

See (D, O, *U, V) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 7, 8, 11, 12) on HOLIDAY PAGE

Overtime: See (5, 6, 7, 8, 11, 12) on HOLIDAY PAGE

* Note: 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 rates.

	07/01/2015	03/07/2016
1st year	\$ 23.10	\$ 23.81
2nd year	27.73	28.58
3rd year	32.36	33.36
4th year	36.99	38.13

Supplemental Benefits per hour:

\$ 18.14 for all hours paid +\$1.00 for all hours worked	\$ 18.75 for all hours paid +\$1.00 for all hours worked

8-137Tun

Operating Engineer - Marine Construction

10/01/2015

JOB DESCRIPTION Operating Engineer - Marine Construction

DISTRICT 4

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:

DREDGING OPERATIONS 07/01/2015

CLASS A

Operator, Leverman, \$ 35.63
Lead Dredgeman

CLASS A1

Dozer, Front Loader
Operator To conform to Operating Engineer
Prevailing Wage in locality where work
is being performed including benefits.

CLASS B

Spider/Spill Barge Operator, \$ 30.81
Tug Operator(over1000hp),
OperatorII, Fill Placer,
Derrick Operator, Engineer,
Chief Mate, Electrician,
Chief Welder,
Maintenance Engineer

Certified Welder, \$ 29.01
Boat Operator(licensed)

CLASS C

Drag Barge Operator, \$ 28.22
Steward, Mate,
Assistant Fill Placer,

Welder (please add)\$ 0.06

Boat Operator \$ 27.30

CLASS D

Shoreman, Deckhand, \$ 22.68
Rodman, Scowman, Cook,
Messman, Porter/Janitor

Oiler(please add)\$ 0.09

SUPPLEMENTAL BENEFITS

Per Hour:

THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes A & B	07/01/2015 \$ 9.99 plus 8% of straight time wage, Overtime hours add \$ 0.63
All Class C	\$ 9.69 plus 8% of straight time wage, Overtime hours add \$ 0.48
All Class D	\$ 9.39 plus 8% of straight time wage, Overtime hours add \$ 0.33

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarConst

Operating Engineer - Survey Crew - Consulting Engineer

10/01/2015

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:	07/01/2015	07/01/2016
Survey Classifications		An Additional
Party Chief	\$ 37.04	\$ 2.24
Instrument Man	30.59	1.98
Rodman	26.52	1.82

SUPPLEMENTAL BENEFITS

Per Hour:

All Crew Members: \$ 19.10

OVERTIME PAY

OVERTIME:.... See (B, E*, Q, V) ON OVERTIME PAGE.

*Doubletime 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

10/01/2015

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: 07/01/2015

Drywall Taper \$ 41.75

SUPPLEMENTAL BENEFITS

Per hour worked: 07/01/2015

Journeyman \$ 20.97

OVERTIME PAY

See (A, H) on OVERTIME PAGE

For Journeyman: Deduct \$4.25 from wage rate BEFORE calculating overtime pay.

For Apprentices: Deduct \$ 2.44 from 2nd term wage rate, and \$ 3.25 from 3rd term wage rate BEFORE calculating overtime pay.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (4, 5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages(per Hour) 07/01/2015

1500 hour terms at the following wage rate:

1st term \$ 18.13

2nd term \$ 27.19

3rd term \$ 36.26

Supplemental Benefits per hour:

One year term (1500 hours)at the following
dollar amount.

1st year \$ 10.25

2nd year \$ 16.43

3rd year \$ 19.25

8-NYDCT9-DWT

Painter

10/01/2015

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2015

Brush \$ 43.75

Abatement/Removal of lead based
or lead containing paint on
materials to be repainted. 43.75

Spray & Scaffold 46.75

Fire Escape 46.75

Decorator 46.75

Paperhanger/Wall Coverer 41.08

SUPPLEMENTAL BENEFITS

Per hour worked: 07/01/2015

Paperhanger	\$ 29.33
All others	20.97
Premium*	23.47*

*Applies only to "All others" category, not paperhanger journeyman.

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

Indentured after 5/31/93 (1) year terms at the following wage rate.
(per hour)

	07/01/2015
Appr 1st term...	\$ 16.55
Appr 2nd term...	21.66
Appr 3rd term...	26.24
Appr 4th term...	35.02

Supplemental benefits:
(per Hour worked)

Appr 1st term...	\$ 10.23
Appr 2nd term...	12.92
Appr 3rd term...	15.20
Appr 4th term...	19.70

8-NYDC9-B/S

Painter - Bridge & Structural Steel

10/01/2015

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 Worked:

STEEL:

Bridge Painting:	07/01/2015	10/01/2015
From May 1st to Nov. 15th -		
	\$ 48.00	\$ 49.00
	+ 5.63*	+ 6.13*
From Nov. 16th to April 30th -		
	\$ 48.00	\$ 49.00
	+ 5.63*	+ 6.13*

*Not subject to overtime and limited to first 40 hours

NOTE: All premium wages are to be calculated on \$48.00 or \$49.00 per hour only.

EXCEPTION: During the period of May 1st to November 15th, for the first and last week of employment on the project, and for the weeks of Memorial Day, Independence Day and Labor Day, this rate shall be paid for the actual number of hours worked.

Power Tool/Spray is an additional \$6.00 per hour above hourly rate, whether straight time or overtime

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.

SUPPLEMENTAL BENEFITS

Per Hour Worked:

Journeyworker:	07/01/2015	10/01/2015
From May 1st to Nov. 15th -		
Hourly Rate up to 40 hours	\$ 28.95	\$ 29.95
Hourly Rate after 40 hours	7.50	7.50

From Nov. 16th to April 30th -		
Hourly Rate up to 50 hours	28.95	29.70
Hourly Rate after 50 hours	7.50	7.50

EXCEPTION: During the period of May 1st to November 15th, for the first and last week of employment on the project, and for the weeks of Memorial Day, Independence Day and Labor Day, this rate shall be paid for the actual number of hours worked.

OVERTIME PAY

See (A, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

(Wage per hour Worked):

Apprentices: (1) year terms	07/01/2015	10/01/2015
1st 90 days	\$ 21.45	\$ 22.05
1st year after 90 days	21.45	22.05
2nd year	32.18	33.08
3rd year	42.90	44.10

Supplemental Benefits per hour worked:

	07/01/2015	10/01/2015
1st 90 days	\$ 8.83	\$ 9.23
1st year after 90 days	11.58	11.98
2nd year	17.37	17.97
3rd year	23.16	23.96

8-DC-9/806/155-BrSS

Painter - Line Striping

10/01/2015

JOB DESCRIPTION Painter - Line Striping

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:

Painter (Striping-Highway):	07/01/2015
Striping-Machine Operator*	\$ 27.11
Linerman Thermoplastic	\$ 32.37

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

Four (4), ten (10) hour days may be worked at straight time during a week.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30R; additionally, there must be a dispensation of hours in place on the project.

SUPPLEMENTAL BENEFITS

Per hour paid: 07/01/2015
Journeyworker:

Striping-Machine operator	\$ 14.18
Linerman Thermoplastic	\$ 14.55

OVERTIME PAY

See (B, E, E2, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 20) on HOLIDAY PAGE
Overtime: See (5, 8, 11, 12, 15, 16, 17, 20, 21, 22) on HOLIDAY PAGE

8-1456-LS

Painter - Metal Polisher**10/01/2015****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

	07/01/2015	06/01/2016	06/01/2017
Metal Polisher	\$ 28.07	\$ 28.88	\$ 29.73
Metal Polisher**	29.02	29.83	30.68
Metal Polisher***	31.57	32.38	33.23

**Note: Applies on New Construction & complete renovation

*** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour:	07/01/2015	06/01/2016	06/01/2017
Journeyworker:			
All classification	\$ 9.12	\$ 9.26	\$ 9.41

OVERTIME PAY

See (B, E, E2, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year term at the following wage rates:

	07/01/2015	06/01/2016
1st year	\$ 11.75	\$ 11.75
2nd year	13.00	13.00
3rd year	15.75	15.75

Supplemental benefits:

Per hour paid:

1st year	\$ 6.26	\$6.26
2nd year	6.37	6.37
3rd year	6.51	6.51

8-8A/28A-MP

Plumber**10/01/2015****JOB DESCRIPTION** Plumber**DISTRICT 8****ENTIRE COUNTIES**

Putnam, Westchester

WAGES

Per hour:

	07/01/2015
Plumber and Steamfitter	\$ 53.16

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 \$ 26.43 Per hour paid
+ \$2.73 per hr. worked**

** Not Subject to Overtime.

OVERTIME PAY

See (B, E, E2, Q, V) on OVERTIME PAGE

OVERTIME: See on OVERTIME PAGE.

* NOTE: Time and one half for the first 8 hours on Saturday. Additional hours on Saturday to be paid at double time.

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	\$ 19.61
2nd Term	22.55
3rd Term	26.00
4th Term	37.27
5th Term	40.01

Supplemental Benefits per hour:

Apprentices

1st term \$11.19 per hour paid
+ 1.16 per hour worked

2nd term 12.38 per hour paid
+ 1.30 per hour worked

3rd term 14.76 per hour paid
+ 1.60 per hour worked

4th term 18.87 per hour paid
+ 2.36 per hour worked

5th term 20.09 per hour paid
+ 2.36 per hour worked

8-21.1-ST

Plumber - HVAC / Service

10/01/2015

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 Wallkill and Shawangunk Prisons) except for remainder of Town of Shawangunk and Towns of Plattekill, Marlboro, and Wawarsing.

WAGES

Per hour: 07/01/2015

HVAC Service \$ 39.70

SUPPLEMENTAL BENEFITS

Per hour worked:

07/01/2015

Journeyworker HVAC Service

\$ 18.09 per hour paid
+ 1.10 per hour worked**

** Not subject to overtime

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

Note: Time and one half for the first eight hours on Saturdays.

Additional hours on Saturday to be paid at double time.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

HVAC SERVICE

REGISTERED APPRENTICES

(1)year terms at the following wages.

	1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.
07/01/2015	\$ 18.59	\$ 21.71	\$ 27.13	\$ 33.19	\$35.69

Supplemental Benefits per hour worked:

Apprentices	07/01/2015
1st term	\$ 15.17 per hour paid + 1.10 per hour worked
2nd term	\$ 15.66 per hour paid + 1.10 per hour worked
3rd term	\$ 16.30 per hour paid + 1.10 per hour worked
4th term	\$ 17.02 per hour paid + 1.10 per hour worked
5th term	\$ 17.57 per hour paid + 1.10 per hour worked

8-21.1&2-SF/Re/AC

Plumber - Jobbing & Alterations

10/01/2015

JOB DESCRIPTION Plumber - Jobbing & Alterations

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Putnam, Ulster, Westchester

WAGES

Per hour:

	07/01/2015
Journeyworker:	\$ 41.15

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	\$ 22.11 per hour paid + 2.73 per hour worked**

**Not subject to overtime

OVERTIME PAY

See (B, *E, E2, Q, V) on OVERTIME PAGE

Note: Time and one half for the first eight hours on Saturdays.

Additional hours on Saturday to be paid at double time.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following wages.

1st year	\$ 18.06
2nd year	20.00
3rd year	21.48
4th year	30.26
5th year	31.90

Supplemental Benefits per hour:

Apprentices

1st year	\$ 7.07 per hour paid + 0.50 per hour worked
2nd year	8.13 per hour paid + 0.93 per hour worked
3rd year	11.43 per hour paid + 1.05 per hour worked
4th year	15.15 per hour paid + 1.46 per hour worked
5th year	16.26 per hour paid + 1.90 per hour worked

8-21.3-J&A

Roofer

10/01/2015

JOB DESCRIPTION Roofer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, New York, Orange, Putnam, Queens, Richmond, Rockland, Sullivan, Ulster, Westchester

WAGES

Per Hour: 07/01/2015

Roofer/Waterproofer \$ 42.20

Note: Abatement/Removal of Asbestos containing roofs and roofing material is classified as Roofer.

SUPPLEMENTAL BENEFITS

Journeyworker \$ 28.93

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 terms at the following percentage of Journeyworkers hourly wage.

1st	2nd	3rd	4th
35%	50%	60%	75%

Supplements per hour paid at the following rates:

1st	2nd	3rd	4th
\$ 2.70	\$ 14.76	\$ 17.59	\$ 21.85

Sheetmetal Worker	10/01/2015

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2015

Sign Erector \$ 45.60

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTAL IRON WORKER CLASS)

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2015

Sign Erector \$ 40.25

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:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$11.08	\$12.55	\$14.04	\$15.51	\$21.93	\$23.86	\$26.46	\$28.45	\$30.42	\$32.40

4-137-SE

Sheetmetal Worker	10/01/2015

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

07/01/2015

SheetMetal Worker \$ 43.41

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 \$ 36.27

OVERTIME PAY

OVERTIME:.. See (B, E, Q,) on OVERTIME PAGE.

*Note: For Sundays or Holidays worked, HOURLY WAGE is double the total of the hourly wage plus the hourly benefit paid all in wages. (Benefits are included in the wages).

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
\$16.07	\$18.07	\$ 20.09	\$ 22.09	\$ 24.09	\$ 26.11	\$ 28.59	\$ 31.07

Supplemental Benefits per hour:

Apprentices

1st term	\$ 15.80
2nd term	17.79
3rd term	19.75
4th term	21.73
5th term	23.72
6th term	25.68
7th term	27.19
8th term	28.69

8-38

Sprinkler Fitter

10/01/2015

JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

WAGES

Per hour

07/01/2015

Sprinkler
Fitter

\$ 41.47

SUPPLEMENTAL BENEFITS

Per hour worked

Journeyman

\$ 21.30

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

For Apprentices HIRED PRIOR TO 04/01/2010:

One Half Year terms at the following percentage of journeyman's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
50%	50%	55%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.15	\$ 8.15	\$ 15.12	\$ 15.12	\$21.30	\$21.30	\$21.30	\$21.30	\$21.30	\$21.30

For Apprentices HIRED ON OR AFTER 04/01/2010:

One Half Year terms at the following percentage of journeyman's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
45%	50%	55%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th

\$ 8.68	\$ 8.74	\$ 15.52	\$ 15.58	\$ 16.04	\$ 16.20	\$ 16.26	\$ 16.31	\$ 16.37	\$ 16.43

For Apprentices HIRED ON OR AFTER 04/01/2013:

One Half Year terms at the following percentage of journeyman's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
45%	50%	55%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 7.90	\$ 7.90	\$ 15.12	\$ 15.12	\$ 15.37	\$ 15.37	\$ 15.37	\$ 15.37	\$ 15.37	\$ 15.37

1-669.2

Teamster - Building / Heavy&Highway	10/01/2015

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, Cement (all types), Suburban, Station Wagons, Cars, Pick Ups, any vehicle carrying materials of any kind.

GROUP B: Tractor & Trailers (all types).

GROUP BB: 14 Wheeler

GROUP C: Low Boy (carrying equipment).

GROUP CC: Light Tower, Attenuator Trucks

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)

07/01/2015

GROUP A	\$ 39.52*
GROUP B	40.14*
GROUP BB	39.64*
GROUP C	42.27*
GROUP CC	39.52*
GROUP D	39.97*
GROUP E	40.52*
GROUP F	41.52*
GROUP G	40.27*
GROUP H	40.89*
GROUP HH	41.27*
GROUP I	41.02*
GROUP II	41.39*

* To calculate premium wage, subtract \$.20 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: NYS DOT or other Governmental Agency contracts shall receive a shift differential of Fifteen(15%) percent above the wage rate

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Fridays and Saturdays may be used as make-up days at straight time when a day during the work week has been lost due to inclement weather.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30R; additionally, there must be a dispensation of hours in place on the project.

SUPPLEMENTAL BENEFITS

Per hour paid:
Journeyworker

First 40 hours	\$25.32
For the 41st-45th hours	10.13
Over 45 hours	0.25

NOTE: Employees entitled to 1 week of paid vacation based on group classification after 90 days of employment.

OVERTIME PAY

See (B, E, P, R) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 9, 15, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 9, 15, 25) on HOLIDAY PAGE

8-456

Welder

10/01/2015

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 07/01/2015

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, if worked

- (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, if worked
- (U) Four times the hourly rate for Holidays, if worked
- (V) Including benefits at SAME PREMIUM as shown for overtime
- (W) Time and one half for benefits on all overtime hours.

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



New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12240

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

☐ Guards, Watchmen

☐ Janitors, Porters, Cleaners,
Elevator Operators

☐ Moving furniture and
equipment

☐ Trash and refuse removal

☐ Window cleaners

☐ Other (Describe)

9. Has this project been reviewed for compliance 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

NOTE: The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = NYS Dept. of Labor; NYC = New York City Comptroller's Office; AG = NYS Attorney General's Office; DA = County District Attorney's Office.

A list of those barred from bidding, or being awarded, any public work contract or subcontract with the State, under section 141-b of the Workers' Compensation Law, may be obtained at the following link, on the NYS DOL Website:

<https://dbr.labor.state.ny.us/EDList/searchPage.do>

NYSDOL Bureau of Public Work Debarment List 10/05/2015
Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL		4618 FOSTER AVE LLC		C/O KAHAN & KAHAN 225 BROADWAY-SUITE 715NEW YORK NY 10007	02/05/2013	02/05/2018
DOL	DOL	*****0711	A ULIANO & SON LTD		22 GRIFFEN COURT MILLER PLACE NY 11746	10/26/2010	10/26/2015
DOL	DOL		A ULIANO CONSTRUCTION		22 GRIFFEN COURT MILLER PLACE NY 11746	10/26/2010	10/26/2015
DOL	DOL	*****0996	A-1 CONSTRUCTION & RENOVATION INC		1973 81ST ST - SUITE A-5 BROOKLYN NY 11214	01/08/2015	01/08/2020
DOL	NYC	*****4486	ABBEY PAINTING CORP		21107 28TH AVENUE BAYSIDE NY 11360	07/02/2012	07/02/2017
DOL	DOL	*****9095	ABDO TILE CO		6179 EAST MOLLOY ROAD EAST SYRACUSE NY 13057	06/25/2010	07/02/2017
DOL	DOL	*****9095	ABDO TILE COMPANY		6179 EAST MOLLOY ROAD EAST SYRACUSE NY 13057	06/25/2010	07/02/2017
DOL	NYC		ABDUL KARIM		C/O NORTH AMERICAN IRON W 1560 DECATUR STREETRIDGEWOOD NY 11385	05/15/2015	05/15/2020
DOL	DOL	*****8488	ABELCRAFT OF NEW YORK CORP		640 ASHFORD AVENUE ARDSLEY NY 10502	08/27/2013	08/27/2018
DOL	DOL	*****1219	ABSOLUTE GENERAL CONTRACTING INC		1229 AVENUE U BROOKLYN NY 11229	01/28/2013	01/28/2018
DOL	DOL	*****4539	ACCOMPLISHED WALL SYSTEMS INC		112 OSCAWANA HEIGHTS ROAD PUTNAM VALLEY NY 10542	08/27/2013	08/27/2018
DOL	DOL	*****8018	ACCURATE MECHANICAL LLC		9547 BUSTLETON AVENUE PHILADELPHIA PA 19115	02/05/2014	02/05/2019
DOL	DOL		ACCURATE MECHANICAL OF PHILADELPHIA LLC		9547 BUSTLETON AVENUE PHILADELPHIA PA 19115	02/05/2014	02/05/2019
DOL	DOL	*****7584	ADAM'S FLOOR COVERING LLC		2718 CURRY ROAD SCHENECTADY NY 12303	07/08/2010	02/15/2017
DOL	DOL		ADESUWA UWUIGBE		P O BOX 21-1022 BROOKLYN NY 11221	05/16/2012	05/16/2017
DOL	NYC		ADRIANA SELA	C/O COLONIAL ROOFING COMPANY INC	247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	DOL	*****6367	ADVANCED METALS		387 RIVERSIDE DRIVE JOHNSON CITY NY 13790	10/01/2012	10/01/2017
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P O BOX 296EAST AURORA NY 14052	07/29/2015	07/29/2020
DOL	DOL	*****2538	AGG MASONRY INC		160 72ND ST - SUITE 721 BROOKLYN NY 11209	03/19/2013	03/19/2018
DOL	DOL		ALBERT CASEY		43-28 54TH STREET WOODSIDE NY 11377	07/01/2011	07/01/2016
DOL	DOL		ALEJANDRO MATOS		C/O SEVEN STAR ELECTRICAL 23-24 STEINWAY STREETASTORIA NY 11105	06/27/2011	06/27/2016
DOL	DOL		ALISHER KARIMOV		C/O AGG MASONRY INC 7105 3RD AVENUEBROOKLYN NY 11209	03/19/2013	03/19/2018
DOL	DOL	*****8740	ALLSTATE ENVIRONMENTAL CORP		C/O JOSE MONTAS 27 BUTLER PLACEYONKERS NY 10710	03/18/2011	03/19/2020
DOL	DOL	*****4274	AMERICAN STEEL MECHANICAL INC		693 PAINTER STREET MEDIA PA 19063	02/20/2013	02/20/2018
DOL	NYC		ANDERSON LOPEZ		670 SOUTHERN BLVD BRONX NY 10455	06/14/2011	06/14/2016
DOL	DOL		ANDREW DIPAUL		C/O CONSOLIDATED INDUSTRI 2051 ROUTE 44/55MODENA NY 12548	12/11/2012	12/11/2017
DOL	NYC		ANDRZEJ WROBEL		24 CONGRESS LANE SOUTH RIVER NJ 08882	05/01/2013	05/01/2018
DOL	DOL	*****7004	ANNEX CONTRACTING LTD		3005 WYNSUM AVENUE MERRICK NY 11566	08/18/2014	08/18/2019
DOL	DOL	*****7004	ANNEX GENERAL CONTRACTING INC		3005 WYNSUM AVENUE MERRICK NY 11566	08/18/2014	08/18/2019
DOL	DA		ANTHONY CARDINALE		58-48 59TH STREET MASPETH NY 11378	05/16/2012	05/08/2020
DOL	DOL		ANTHONY J MINGARELLI JR		C/O T & T CONCRETE INC 2560 HAMBURG TURNPIKELACKAWANNA NY 14218	07/08/2015	07/08/2020

NYSDOL Bureau of Public Work Debarment List 10/05/2015

Article 8

DOL	DOL		ANTHONY ULIANO		22 GRIFFEN COURT MILLER PLACE NY 11746	10/26/2010	10/26/2015
DOL	DOL	*****3020	APCO CONTRACTING CORP		24 SOUTH MARYLAND AVENUE PORT WASHINGTON NY 11050	09/24/2012	09/02/2020
DOL	DOL	*****3219	APOLLO CONSTRUCTION SERVICES CORP	APOLLO PAINTING CO	157 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		APOLLO PAINTING CO		157 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****3295	APOLLO PAINTING CORP		3 ALAN B SHEPART PLACE YONKERS NY 10705	03/12/2014	03/12/2019
DOL	AG	*****0194	APPLIED CONSTRUCTION INC		46 RUGBY ROAD WESTBURY NY 11590	11/20/2013	11/20/2018
DOL	NYC	*****8403	AQUA JET PAINTING CORP		10 VIKING DRIVE WEST ISLIP NY 11795	04/16/2014	04/16/2019
DOL	DOL	*****3953	ASCAPE LANDSCAPE & CONSTRUCTION CORP		634 ROUTE 303 BLAUVELT NY 10913	07/26/2012	11/19/2018
DOL	NYC	*****4779	ASTORIA GENERAL CONTRACTING CORP		35-34 31ST STREET LONG ISLAND CITY NY 11106	09/02/2015	09/02/2020
DOL	NYC		AUDLEY O'BRIEN		1273 NORTH AVENUE/#1 CP NEW ROCHELLE NY 10804	04/07/2015	04/07/2020
DOL	DOL		AVIS R HILL		3510 HICKORY WALK LANE ELLENWOOD GA 32094	01/22/2015	01/22/2020
DOL	DOL	*****2534	B & B CONCRETE CONTRACTORS INC		55 OLD TURNPIKE ROAD SUITE 612NANUET NY 10954	02/04/2011	02/04/2016
DOL	DOL		BARBARA CASSIDY		7 BLENIS PLACE VALHALLA NY 10595	04/02/2015	04/02/2020
DOL	DOL	*****2294	BEDELL CONTRACTING CORP		2 TINA LANE HOPEWELL JUNCTION NY 12533	01/06/2012	01/06/2017
DOL	DOL	*****6999	BEST ROOFING OF NEW JERSEY LLC		30 MIDLAND AVENUE WALLINGTON NJ 07057	11/05/2010	11/05/2015
DOL	DOL		BEVERLY F WILLIAMS		1238 PRESIDENT STREET BROOKLYN NY 11225	11/18/2013	11/18/2018
DOL	DOL		BIAGIO CANTISANI		200 FERRIS AVENUE WHITE PLAINS NY 10603	12/04/2009	05/04/2017
DOL	NYC	*****6555	BROOKLYN WELDING CORP		1273 NORTH AVENUE/ #1 CP NEW ROCHELLE NY 10804	04/07/2015	04/07/2020
DOL	DOL	*****6156	C & J LANDSCAPING & MAINTENANCE INC		520 PINE HILL ROAD CHESTER NY 10940	06/23/2014	06/23/2019
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 FERRIS AVENUE WHITE PLAINS NY 10603	12/04/2009	05/04/2017
DOL	DOL		CANTISANI HOLDING LLC		220 FERRIS AVENUE WHITE PLAINS NY 10603	05/04/2012	05/04/2017
DOL	DOL	*****1143	CARMODY BUILDING CORP		442 ARMONK ROAD MOUNT KISCO NY 10549	05/04/2012	05/04/2017
DOL	DOL	*****3368	CARMODY CONCRETE CORP		442 ARMONK ROAD MOUNT KISCO NY 10549	12/04/2009	05/04/2017
DOL	DOL		CARMODY CONTRACTING CORP		220 FERRIS AVENUE WHITE PLAINS NY 10603	05/04/2012	05/04/2017
DOL	DOL	*****6215	CARMODY CONTRACTING INC		220 FERRIS AVENUE WHITE PLAINS NY 10603	05/04/2012	05/04/2017
DOL	DOL		CARMODY ENTERPRISES LTD		220 FERRIS AVENUE WHITE PLAINS NY 10603	12/04/2009	05/04/2017
DOL	DOL	*****3812	CARMODY INC		442 ARMONK ROAD MOUNT KISCO NY 10549	12/04/2009	05/04/2017
DOL	DOL	*****3812	CARMODY INDUSTRIES INC		442 FERRIS AVENUE WHITE PLAINS NY 10603	05/04/2012	05/04/2017
DOL	DOL		CARMODY MAINTENANCE CORP		105 KISCO AVENUE MOUNT KISCO NY 10549	05/04/2012	05/04/2017
DOL	DOL	*****0324	CARMODY MASONRY CORP		442 ARMONK ROAD MOUNT KISCO NY 10549	12/04/2009	05/04/2017
DOL	DOL	*****3812	CARMODY"2" INC		220 FERRIS AVENUE WHITE PLAINS NY 10603	12/04/2009	05/04/2017
DOL	NYC	*****9172	CASSIDY EXCAVATING INC		14 RAILROAD AVENUE VALHALLA NY 10595	05/15/2014	04/02/2020
DOL	DOL	*****1683	CATONE CONSTRUCTION COMPANY INC		294 ALPINE ROAD ROCHESTER NY 14423	03/09/2012	03/09/2017
DOL	DOL		CATONE ENTERPRISES INC		225 DAKOTA STREET ROCHESTER NY 14423	03/09/2012	03/09/2017
DOL	DOL	*****6745	CATSKILL FENCE INSTALLATIONS INC		5445 ROUTE 32 CATSKILL NY 12414	08/22/2014	08/22/2019
DOL	DOL	*****8530	CAZ CONTRACTING CORP		37-11 35TH AVENUE LONG ISLAND CITY NY 11101	08/26/2013	08/26/2018
DOL	DOL	*****5556	CERTIFIED INSTALLERS INC		113 N MAPLE AVENUE GREENSBURG PA 15601	02/21/2013	02/21/2018

NYSDOL Bureau of Public Work Debarment List 10/05/2015

Article 8

DOL	NYC		CHARLES CASSIDY JR		14 RAILROAD AVENUE VALHALLA NY 10595	05/15/2014	04/02/2020
DOL	DOL		CHARLES OKRASKI		67 WARD ROAD SALT POINT NY 12578	01/21/2011	01/21/2016
DOL	DOL	*****1416	CHEROMINO CONTROL GROUP LLC		61 WILLET ST - SUITE 14 PASSAIC NJ 07055	12/03/2009	02/23/2017
DOL	DOL		CHRIS SAVOURY		44 THIELLS-MT IVY ROAD POMONA NY 10970	10/14/2011	10/14/2016
DOL	DOL		CHRIST R PAPAS		C/O TRAC CONSTRUCTION INC 9091 ERIE ROADANGOLA NY 14006	02/03/2011	02/03/2016
DOL	DOL		CHRISTOF PREZBYL		2 TINA LANE HOPEWELL JUNCTION NY 12533	01/06/2012	01/06/2017
DOL	DOL	*****3360	CITY LIMITS GROUP INC		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	NYC	*****1768	COFIRE PAVING CORPORATION		120-30 28TH AVENUE FLUSHING NY 11354	01/14/2011	01/14/2016
DOL	NYC	*****2905	COLONIAL ROOFING COMPANY INC		247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	NYC	*****3182	COLORTECH INC		5990 58TH AVENUE MASPETH NY 11378	11/18/2013	11/18/2018
DOL	DOL	*****8342	CONKLIN PORTFOLIO LLC		60 COLONIAL ROAD STILLWATER NY 12170	02/15/2011	02/15/2016
DOL	DOL	*****2703	CONKLIN'S TECH- MECHANICAL INC		5 PARKER AVENUE POUGHKEEPSIE NY 12601	03/25/2014	03/25/2019
DOL	DOL	*****4175	CONSOLIDATED INDUSTRIAL SERVICES INC		2051 ROUTE 44/55 MODENA NY 12548	12/11/2012	01/28/2018
DOL	DOL		CONSTANTINOS ZERVAS		37-11 35TH AVENUE LONG ISLAND CITY NY 11101	08/26/2013	08/26/2018
DOL	DOL	*****5740	CORTLAND GLASS COMPANY INC		336 TOMPKINS STREET CORTLAND NY 13045	10/21/2010	07/15/2016
DOL	NYC	*****4468	CRAFT CONTRACTING GROUP INC		3256 BRUNER AVENUE BRONX NY 10469	07/29/2014	07/29/2019
DOL	NYC	*****8507	CRAFT FENCE INC		3256 BRUNER AVENUE BRONX NY 10469	07/29/2014	07/29/2019
DOL	DOL	*****0810	D & G PAINTING & DECORATING INC		53 LITTLE COLLABAR ROAD MONTGOMERY NY 12549	04/19/2012	04/19/2017
DOL	DOL		DARYL T RIEKS		C/O RIEKS CONTRACTING LLC 4804 GAHWILER ROAD AUBURN NY 13021	05/01/2015	05/01/2020
DOL	NYC		DAWN AVILA AKA DAWN BECHTOLD		1ST FLOOR STORE FRONT 88-10 LITTLE NECK PARKWAY FLORAL PARK NY 11001	06/24/2014	06/24/2019
DOL	NYC		DAWN BECHTOLD AKA DAWN AVILA		1ST FLOOR STORE FRONT 88-10 LITTLE NECK PARKWAY FLORAL PARK NY 11001	06/24/2014	06/24/2019
DOL	DOL		DEAN ROBBINS III		212 OXFORD WAY SCHENECTADY NY 12309	12/11/2012	09/16/2018
DOL	NYC	*****3865	DECOMA BUILDING CORPORATION		134 EVERGREEN PL/STE 101 EAST ORANGE NJ 07018	12/30/2013	12/30/2018
DOL	DOL	*****1446	DELTA CONTRACTING PAINTING AND DECORATING INC		437 SUNRISE HIGHWAY WEST BABYLON NY 11707	08/12/2013	08/12/2018
DOL	DOL	*****3538	DELTA CONTRACTING PAINTING AND DESIGN INC		75 MCCULLOCH DRIVE DIX HILLS NY 11746	10/19/2010	08/12/2018
DOL	DOL		DEMETRIOS KOUTSOURAS		530 BEECH STREET NEW HYDE PARK NY 11040	07/02/2012	07/02/2017
DOL	DOL	*****9868	DESANTIS ENTERPRISES		161 OSWEGO RIVER ROAD PHOENIX NY 13135	09/24/2013	11/18/2018
DOL	NYC	*****8234	DEWATERS PLUMBING AND HEATING LLC		30 COLUMBUS CIRCLE EASTCHESTER NY 10709	08/21/2012	08/21/2017
DOL	DOL	*****9252	DI BERNARDO TILE AND MARBLE CO INC		15 WALKER WAY ALBANY NY 12205	03/21/2014	03/21/2019
DOL	DOL		DIANE DEAVER		731 WARWICK TURNPIKE HEWITT NJ 07421	06/25/2012	12/11/2017
DOL	NYC		DIMITRIOS KOUTSOUKOS		C/O ASTORIA GENERAL CONTR 35-34 31ST STREET LONG ISLAND CITY NY 11106	09/02/2015	09/02/2020
DOL	DOL		DORIS SKODA		C/O APCO CONTRACTING CORP 24 SOUTH MARYLAND AVENUE PORT WASHINGTON NY 11050	09/24/2012	09/02/2020

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DOL	DOL	*****6982	DUFOUR GROUP INC	DUFOUR MASONRY	353 WEST 56TH STREET #7M NEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL		DUFOUR MASONRY		353 WEST 56TH STREET #7M NEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL		DUFOUR MASONRY & RESTORATION INC		353 WEST 56TH STREET #7M NEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL	*****5840	DYNA CONTRACTING INC		363 88TH STREET BROOKLYN NY 11209	11/18/2013	11/18/2018
DOL	DOL		EARL GALBREATH		640 ASHFORD AVENUE ARDSLEY NY 10502	08/27/2013	08/27/2018
DOL	DOL	*****1496	EAST COAST DRYWALL INC		1238 PRESIDENT STREET BROOKLYN NY 11225	11/18/2013	11/18/2018
DOL	DOL	*****8011	EOCA CLEANING CONTRACTORS INC		P O BOX 21-1022 BROOKLYN NY 11221	05/16/2012	05/16/2017
DOL	NYC	*****8074	ECONOMY IRON WORKS INC		670 SOUTHERN BLVD BRONX NY 10455	06/14/2011	06/14/2016
DOL	DOL		EDWARD L GAUTHIER		C/O IMPERIAL MASONRY REST 141 ARGONNE DRIVEKENMORE NY 14217	10/03/2012	10/03/2017
DOL	NYC		EDWARD MENKEN		C/O AQUA JET PAINTING 10 VIKING DRIVEWEST ISLIP NY 11795	04/16/2014	04/16/2019
DOL	NYC	*****0900	EF PRO CONTRACTING INC		147 BROOME AVENUE ATLANTIC BEACH NY 11509	03/03/2014	03/03/2019
DOL	NYC		EFSTRATIOS BERNARDIS		23-73 48TH STREET LONG ISLAND CITY NY 11103	04/24/2014	04/24/2019
DOL	NYC	*****6260	EL TREBOL SPECIAL CLEANING INC		95-26 76TH STREET OZONE PARK NY 11416	10/12/2011	10/12/2016
DOL	DOL		ELIZABETH RAMADANI		C/O RAMADA CONSTRUCTION 80 SAVO LOOPSTATEN ISLAND NY 10309	01/07/2014	01/07/2019
DOL	DOL		ELLEN DESANTIS	DESANTIS ENTERPRISES	161 OSWEGO RIVER ROAD PHOENIX NY 13135	09/24/2013	11/18/2018
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	AG		EMILIO FRANZA		90 JUNIUS STREET BROOKLYN NY 11212	01/23/2014	01/23/2019
DOL	DOL		EMPIRE CONCRETE SERVICES LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL	*****0511	EMPIRE CONCRETE SYSTEMS LLC		101 SULLYS TRAIL/ SUITE 2 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL	*****2353	EMPIRE CONSTRUCTORS LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL		EMPIRE PRECAST LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL		ERIKA BARNETT		253 BEACH BREEZE LANE UNIT BARVERNE NY 11692	02/05/2013	02/05/2018
DOL	DOL		ESTEVEES & FRAGA CONSTRUCTION CO INC		986 MADISON AVENUE PATERSON NJ 07501	01/03/2013	01/03/2018
DOL	DOL		ESTEVEES & FRAGA INC		986 MADISON AVENUE PATERSON NJ 07501	01/03/2013	01/03/2018
DOL	DOL		EVELIO ELLEDIAS		114 PEARL STREET PORT CHESTER NY 10573	08/15/2012	08/15/2017
DOL	NYC		EVERTON CARLESS		134 EVERGREEN PL/STE 101 EAST ORANGE NJ 07018	12/30/2013	12/30/2018
DOL	DOL		F KALAFATIS		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL		FANTASTIC PAINTING		493 LANSING ROAD FULTONVILLE NY 12072	11/18/2013	11/18/2018
DOL	DOL	*****5867	FJM-FERRO INC		6820 14TH AVENUE BROOKLYN NY 11219	10/27/2011	10/27/2016
DOL	DOL	*****1311	FLOZ-ON PAINTING & DECORATING INC		12 DUNDERBERG ROAD TOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL	*****8961	FLOZ-ON PAINTING INC		12 DUNDERBERG ROAD TOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL		FMS		4 LEGHORN COURT NEW YORK NY 11746	11/28/2012	11/28/2017
DOL	DOL	*****8067	FORTH SPORT FLOORS INC		P O BOX 74 EAST GREENBUSH NY 12061	02/28/2012	10/01/2017
DOL	DOL		FRAN MICELI		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL		FRANCES KALAFATIS		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL		FRANCES KALAFATIS-MICELI		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019

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DOL	NYC		FRANK ACOCELLA		68 GAYLORD ROAD SCARSDALE NY 10583	02/10/2011	02/10/2016
DOL	DOL		FRANK J MERCANDO		134 MURRAY AVENUE YONKERS NY 10704	12/11/2009	02/03/2019
DOL	DOL		FRANK MICELI JR	C/O FRANK MICELI JR CONTRACTIN G INC	19 CLIFF STREET NEW ROCHELLE NY 10801	10/16/2013	10/16/2018
DOL	DOL	*****1321	FRANK MICELI JR CONTRACTING INC		19 CLIFF STREET NEW ROCHELLE NY 10801	10/16/2013	10/16/2018
DOL	DOL		FRED ABDO	ABDO TILE COMPANY AKA ABDO TILE CO	6179 EAST MOLLOY ROAD EAST SYRACUSE NY 13057	06/25/2010	07/02/2017
DOL	DOL	*****2724	FRESH START PAINTING CORP		157 TIBBETS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		G FUCCI CONSTRUCTION SERVICES		3 ALAN B SHEPARD PLACE YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****6767	G FUCCI PAINTING INC		C/O SPIEGEL & UTRERA 1 MAIDEN LANE - 5TH FL NEW YORK NY 10038	03/12/2014	03/12/2019
DOL	DOL	*****4546	GAF PAINTING LLC		157 TIBBETS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GARDEN STATE PAINTING		157 TIBBETS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GARY MCDOWELL	GM CONSTRUCTI ON & LAWN CARE SERVICE	76 PLEASANT STREET WELLSVILLE NY 14895	06/11/2013	06/11/2018
DOL	DOL		GEORGE DI BERNARDO		C/O DI BERNARDO TILE 15 WALKER WAYALBANY NY 12205	03/21/2014	03/21/2019
DOL	NYC		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GERALD A POLLOCK		336 TOMPKINS STREET CORTLAND NY 13045	06/29/2010	07/15/2016
DOL	DOL		GERALD F POLUCH JR		2085 BRIGHTON HENRIETTA TOWN LINE ROADROCHESTER NY 14623	11/04/2010	11/04/2015
DOL	DOL	*****1075	GLOBAL TANK CONSTRUCTION LLC		P O BOX 1238 SALINA OK 74365	11/28/2012	11/28/2017
DOL	DOL	*****0878	GM CONSTRUCTION & LAWN CARE SERVICE		76 PLEASANT STREET WELLSVILLE NY 14895	06/11/2013	06/11/2018
DOL	DOL	*****0090	GOLDS FLOORING INSTALLATIONS INC		25 HAMILTON ROAD MONTICELLO NY 12701	10/16/2013	10/16/2018
DOL	DOL		GREGORY A FUCCI		C/O PAF PAINTING SERVICES 157 TIBBETS ROADYONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GREGORY FUCCI JR		C/O APOLLO CONSTRUCTION 157 TIBBETS ROADYONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GRETCHEN SULLIVAN		P O BOX 130 CRETE IL 60417	11/10/2011	11/10/2016
DOL	DOL	*****7735	GRYF CONSTRUCTION INC		394 SPOTSWOOD-ENGLISH RD MONROE NJ 08831	08/08/2011	08/08/2016
DOL	DOL	*****9456	GUILLO CONTRACTING CORP		P O BOX 229 CALVERTON NY 11933	07/08/2013	07/08/2018
DOL	DOL		GUS PAPASTEFANOU		C/O D & G PAINTING & DECO 53 LITTLE COLLABAR ROADMONTGOMERY NY 12549	04/19/2012	04/19/2017
DOL	NYC	*****0346	H N H CONTRACTORS CORP		4558 BROADWAY # 6 NEW YORK NY 10040	08/04/2014	08/04/2019
DOL	DOL		H.H. RAUH CONSTRUCTION, LLC		2930 RT. 394 ASHVILLE NY 14710	01/14/2011	01/14/2016
DOL	DOL	*****2499	H.H. RAUH CONTRACTING CO., LLC		2930 RT. 394 ASHVILLE NY 14710	01/14/2011	01/14/2016
DOL	DOL		H.H. RAUH PAVING, INC.		7 WEST 1ST ST. LAKEWOOD NY 14750	01/14/2011	01/14/2016
DOL	DOL		HALSSAM FOSTOK		5 HANSEN PLACE WAYNE NJ 07470	09/18/2013	09/18/2018
DOL	NYC		HAMEEDUL HASAN		240 HOME STREET TEANECK NJ 07666	08/04/2014	08/04/2019
DOL	AG	*****9918	HARA ELECTRIC CORP		2461 47TH STREET ASTORIA NY 11103	09/26/2013	09/26/2018
DOL	DOL	*****5405	HARD LINE CONTRACTING INC		89 EDISON AVENUE MOUNT VERNON NY 10550	10/28/2011	10/28/2016

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DOL	AG		HARVINDER SINGH PAUL		90 JUNIUS STREET BROOKLYN NY 11212	01/23/2014	01/23/2019
DOL	DOL		HI-TECH CONTRACTING CORP		114 PEARL STREET PORT CHESTER NY 10573	08/15/2012	08/15/2017
DOL	DOL	*****4331	HIDDEN VALLEY EXCAVATING INC		225 SEYMOUR STREET FREDONIA NY 14063	02/08/2011	02/08/2016
DOL	DOL	*****6370	HILLIANO CONSTRUCTION & ELECTRICAL INC		354 MAGNOLIA STREET ROCHESTER NY 14611	01/22/2015	01/22/2020
DOL	DOL	*****8426	IMPERIAL MASONRY RESTORATION INC		141 ARGONNE DRIVE KENMORE NY 14217	10/03/2012	10/03/2017
DOL	DOL		ISABEL FRAGA		C/O THREE FRIENDS CONSTR 986 MADISON AVENUEPATERSON NJ 07501	01/03/2013	01/03/2018
DOL	DOL	*****7598	J M RICH LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL	*****3478	J N P CONSTRUCTION CORP		50 LOUIS COURT P O BOX 1907SOUTH HACKENSACK NY 07606	03/21/2014	03/21/2019
DOL	DOL		J N RICH LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL	*****9368	J TECH CONSTRUCTION		PO BOX 64782 ROCHESTER NY 14624	09/24/2012	09/24/2017
DOL	DOL		J THE HANDYMAN			09/24/2012	09/24/2017
DOL	DOL	*****4910	J V MAGIC TOUCH CORPORATION		94-25 57TH AVENUE, APT 5G ELMHURST NY 11373	01/12/2015	01/12/2020
DOL	DOL		JACQUELINE HOWE		C/O FLOZ-ON PAINTING INC 12 DUNDERBERG ROADTOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL	*****8627	JAG I LLC		635 LUZERNE ROAD QUEENSBURY NY 12804	09/16/2013	09/16/2018
DOL	DOL	*****2868	JAG INDUSTRIES INC		175 BROAD ST - SUITE 320 GLENS FALLS NY 12801	09/16/2013	09/16/2018
DOL	DOL		JAMES BOYCE		C/O EMPIRE CONCRETE SYST 101 SULLYS TRAIL/SUITE 20PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL		JAMES SICKAU		3090 SHIRLEY ROAD NORTH COLLINS NY 14111	04/19/2011	07/08/2020
DOL	DOL		JAMES WALSH		89 EDISON AVENUE MOUNT VERNON NY 10550	10/28/2011	10/28/2016
DOL	DOL		JASON M RICH		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL		JAY PRESUTTI		C/O CONSOLIDATED INDUSTRI 2051 ROUTE 44/55MODENA NY 12548	01/28/2013	01/28/2018
DOL	DOL		JEFF P BRADLEY		520 PINE HILL ROAD CHESTER NY 10940	06/23/2014	06/23/2019
DOL	NYC		JEFFREY CASSIDY		14 RAILROAD AVENUE VALHALLA NY 10595	05/15/2014	04/02/2020
DOL	DOL		JERALD HOWE		C/O FLOZ-ON PAINTING INC 12 DUNDERBERG ROADTOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL		JEROME LACITIGNOLA		C/O CATSKILL FENCE INSTAL 5445 ROUTE 32 CATSKILL NY 12414	08/22/2014	08/22/2019
DOL	NYC		JERRY DEWATERS		30 COLUMBUS CIRCLE EASTCHESTER NY 10709	08/21/2012	08/21/2017
DOL	DOL		JOHN CATONE		C/O CATONE CONSTRUCTION 294 ALPINE ROADROCHESTER NY 14612	03/09/2012	03/09/2017
DOL	DOL		JOHN DESCUL		437 SUNRISE HIGHWAYA WEST BABYLON NY 11704	08/12/2013	08/12/2018
DOL	NYC		JOHN FICARELLI		120-30 28TH AVENUE FLUSHING NY 11354	01/14/2011	01/14/2016
DOL	DOL		JOHN H LEE	JOHN LEE QUALITY PAVING	67 WILER ROAD HILTON NY 14468	01/28/2013	01/28/2018
DOL	DOL	*****1749	JOHN LEE QUALITY PAVING		67 WILER ROAD HILTON NY 14468	01/28/2013	01/28/2018
DOL	DOL		JON E DEYOUNG		261 MILL ROAD P O BOX 296EAST AURORA NY 14052	07/29/2015	07/29/2020
DOL	DOL	*****9368	JORGE I DELEON	J TECH CONSTRUCTI ON	PO BOX 64782 ROCHESTER NY 14624	09/24/2012	09/24/2017
DOL	DOL		JORGE OUVINA		344 SOUNDVIEW LANE COLLEGE POINT NY 11356	11/22/2011	11/22/2016

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DOL	DOL		JORGE VILLALOBOS		94-25 57TH AVENUE - APT 5 ELMHURST NY 11373	01/12/2015	01/12/2020
DOL	DOL		JOSE MONTAS		27 BUTLER PLACE YONKERS NY 10710	03/18/2011	03/19/2020
DOL	DOL		JOSEPH CASUCCI		6820 14TH AVENUE BROOKLYN NY 11219	10/27/2011	10/27/2016
DOL	DOL		JOSEPH MARTONE		112 OSCAWANA HEIGHTS ROAD PUTNAM VALLEY NY 10542	08/27/2013	08/27/2018
DOL	DOL		JOSHUA DEBOWSKY		9547 BUSTLETON AVENUE PHILADELPHIA PA 19115	02/05/2014	02/05/2019
DOL	DOL		JOYA MUSCOLINO		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	DOL		JUANA MARTINEZ		C/O LEAD CONSTRUCTION 27 BUTLER PLACEYONKERS NY 10710	03/19/2015	03/19/2020
DOL	DOL	*****4340	JUBCO SITE DEVELOPMENT LLC		462 LAKEVIEW AVENUE VALHALLA NY 10595	12/16/2013	12/16/2018
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL		KAREN HARTMAN		C/O GUILLO CONTRACTING P O BOX 229CALVERTON NY 11933	07/08/2013	07/08/2018
DOL	NYC		KATHLEEN SELA	C/O COLONIAL ROOFING COMPANY INC	247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	DOL		KEITH SCHEPIS		C/O KJS HAULING AND HOME 95 MAPLE AVENUE NEW CITY NY 10956	04/15/2013	04/15/2018
DOL	DOL		KEN DEAVER		731 WARWICK TURNPIKE HEWITT NJ 07421	06/25/2012	12/11/2017
DOL	DOL		KEVIN BABCOCK JR		P O BOX 46 THOMPSON RIDGE NY 10985	08/22/2014	08/22/2019
DOL	DOL		KEVIN M BABCOCK		P O BOX 46 THOMPSON RIDGE NY 10985	08/22/2014	08/22/2019
DOL	DOL	*****5941	KINGSVIEW ENTERPRISES INC		7 W FIRST STREET P O BOX 2LAKEWOOD NY 14750	01/14/2011	01/14/2016
DOL	DOL	*****2463	KJS HAULING AND HOME IMPROVEMENT INC		95 MAPLE AVENUE NEW CITY NY 10956	04/15/2013	04/15/2018
DOL	AG		KOSTAS "GUS" ANDRIKOPOULOS		2461 47TH STREET ASTORIA NY 11103	09/26/2013	09/26/2018
DOL	DOL		KRZYSZTOF PRXYBYL		2 TINA LANE HOPEWELL JUNCTION NY 12533	01/06/2012	01/06/2017
DOL	DOL	*****6033	KUSNIR CONSTRUCTION		2677 ANAWALK ROAD KATONAH NY 10536	08/03/2012	08/03/2017
DOL	DOL	*****0526	LAGUARDIA CONSTRUCTION CORP		47-40 48TH STREET WOODSIDE NY 11377	07/01/2011	07/01/2016
DOL	NYC	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL	*****6224	LAKESIDE FIRE SPRINKLERS LLC		125 CHAUTAUQUA AVENUE LAKEWOOD NY 14750	06/24/2015	06/24/2020
DOL	DOL		LARRY DOMINGUEZ		114 PEARL STREET PORT CHESTER NY 10573	08/15/2012	08/15/2017
DOL	DOL		LAURA A. GAUTHIER		C/O IMPERIAL MASONRY REST 141 ARGONNE DRIVEKENMORE NY 14217	10/03/2012	10/03/2017
DOL	DOL		LAURI MARTONE		112 OSCAWANA HEIGHTS ROAD PUTNAM VALLEY NY 10542	08/27/2013	08/27/2018
DOL	DOL		LAVERN GLAVE		C/O RAW POWER ELECTRIC 3 PARK CIRCLEMIDDLETOWN NY 10940	09/15/2014	09/15/2019
DOL	DOL		LAWRENCE J RUGGLES		P O BOX 371 ROUND LAKE NY 12151	05/12/2014	05/12/2019
DOL	DOL	*****1364	LEAD CONSTRUCTION SERVICES INC		3 ALAN B SHEPARD PLACE YONKERS NY 10705	03/19/2015	03/19/2020
DOL	DOL	*****0597	LEED INDUSTRIES CORP	HI-TECH CONTRACTIN G CORP	114 PEART STREET PORT CHESTER NY 10573	08/15/2012	08/15/2017
DOL	AG		LEONID FRIDMAN		APT 5 200 BRIGHTON, 15TH STBROOKLYN NY 11235	01/23/2013	01/23/2019
DOL	DOL		LINDSEY R CRILL		143 FILLMORE AVENUE BUFFALO NY 14210	01/08/2015	01/08/2020

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DOL	DOL	*****8453	LINPHILL ELECTRICAL CONTRACTORS INC		523 SOUTH 10TH AVENUE MOUNT VERNON NY 10553	01/07/2011	04/15/2018
DOL	DOL		LINVAL BROWN		523 SOUTH 10TH AVENUE MOUNT VERNON NY 10553	01/07/2011	04/15/2018
DOL	NYC	*****2850	M A 2 FLAGS CONTRACTING CORP		25-18 100TH STREET EAST ELMHURST NY 11369	08/21/2013	08/21/2018
DOL	NYC	*****6317	M S QUALITY CONSTRUCTION LLC		27 MAPLEWOOD AVENUE COLONIA NJ 07067	02/04/2015	02/04/2020
DOL	NYC		MACIEJ SONTOWSKI		27 MAPLEWOOD AVENUE COLONIA NJ 07067	02/04/2015	02/04/2020
DOL	NYC	*****3141	MACKEY REED ELECTRIC INC		1ST FLOOR STORE FRONT 88-10 LITTLE NECK PARKWAYFLORAL PARK NY 11001	06/24/2014	06/24/2019
DOL	DOL		MANUEL ESTEVES		55 OLD TURNPIKE ROAD SUITE 612NANUET NY 10954	02/04/2011	02/04/2016
DOL	NYC		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	NYC		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		MAR CONTRACTING CORP		620 COMMERCE STREET THORNWOOD NY 10594	09/24/2012	09/24/2017
DOL	DOL		MARGARET FORTH		P O BOX 74 EAST GREENBUSH NY 12061	02/28/2012	10/01/2017
DOL	DOL		MARIA ESTEVES AKA MARIA MARTINS		C/O THREE FRIENDS CONSTR 986 MADISON AVENUEPATERSON NJ 07501	01/03/2013	01/03/2018
DOL	DOL		MARIA MARTINS AKA MARIA ESTEVES		C/O THREE FRIENDS CONSTR 986 MADISON AVENUEPATERSON NJ 07501	01/03/2013	01/03/2018
DOL	DOL		MARIO LUIS		31 DURANT AVENUE BETHEL CT 06801	07/02/2012	07/02/2017
DOL	DOL	*****5533	MARQUISE CONSTRUCTION & DEVELOPMENT CORP		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	DOL	*****8810	MARQUISE CONSTRUCTION ASSOCIATES INC		20 BOSWELL ROAD PUTNAM VALLEY NY 10579	09/03/2013	09/03/2018
DOL	DOL	*****1134	MARQUISE CONSTRUCTION CORP		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	NYC	*****4314	MASCON RESTORATION INC		129-06 18TH AVENUE COLLEGE POINT NY 11356	02/09/2012	02/09/2017
DOL	NYC	*****4314	MASCON RESTORATION LLC		129-06 18TH AVENUE COLLEGE POINT NY 11356	02/09/2012	02/09/2017
DOL	DOL	*****0845	MASONRY CONSTRUCTION INC		442 ARMONK ROAD MOUNT KISCO NY 10549	12/04/2009	05/04/2017
DOL	DOL	*****3333	MASONRY INDUSTRIES INC		442 ARMONK ROAD MOUNT KISCO NY 10549	12/04/2009	05/04/2017
DOL	DOL	*****9857	MBL CONTRACTING CORPORATION		2620 ST RAYMOND AVENUE BRONX NY 10461	08/30/2011	08/30/2016
DOL	DOL	*****9028	MCINTOSH INTERIORS LLC		8531 AVENUE B BROOKLYN NY 11236	02/05/2013	02/05/2018
DOL	DOL	*****5936	MCSI ADVANCED AV SOLUTIONS LLC		2085 BRIGHTON HENRIETTA TOWN LINE ROADROCHESTER NY 14623	11/04/2010	11/04/2015
DOL	DOL	*****4259	MERCANDO CONTRACTING CO INC		134 MURRAY AVENUE YONKERS NY 10704	12/11/2009	02/03/2019
DOL	DOL	*****0327	MERCANDO INDUSTRIES LLC		134 MURRAY AVENUE YONKERS NY 10704	12/11/2009	02/03/2019
DOL	NYC	*****5330	METRO DUCT SYSTEMS INC		12-19 ASTORIA BOULEVARD LONG ISLAND CITY NY 11102	04/16/2014	06/24/2019
DOL	DOL	*****3368	MICEK CONSTRUCTION CO INC		20 CROSS STREET FALCONER NY 14733	12/02/2014	12/02/2019
DOL	DOL	*****9198	MICHAEL CZECHOWICZ	OCTAGON CO	37-11 35TH AVENUE-2ND FL LONG ISLAND CITY NY 11101	01/08/2013	01/08/2018
DOL	DOL		MICHAEL F LEARY JR		3813 SNOWDEN HILL ROADNEW HARTFORD NY 13413	06/19/2013	06/19/2018
DOL	DOL		MICHAEL F LEARY JR METAL STUD & DRYWALL		3813 SNOWDEN HILL ROAD NEW HARTFORD NY 13413	06/19/2013	06/19/2018
DOL	DOL		MICHAEL KTISTAKIS		363 88TH STREET BROOKLYN NY 11209	11/18/2013	11/18/2018
DOL	DOL	*****6033	MICHAEL KUSNIR	KUSNIR CONSTRUCTION	2677 ANAWALK ROAD KATONAH NY 10536	08/03/2012	08/03/2017
DOL	DOL		MICHAEL MARGOLIN		4 LEGHORN COURT NEW YORK NY 11746	11/28/2012	11/28/2017
DOL	DOL		MICHELLE L BARBER		635 LUZERNE ROAD QUEENSBURY NY 12804	09/16/2013	09/16/2018

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DOL	DOL	*****2635	MIDLAND CONSTRUCTION OF CEDAR LAKE INC		13216 CALUMET AVENUE CEDAR LAKE IL 46303	11/10/2011	11/10/2016
DOL	NYC		MIGUEL ACOSTA		25-18 100TH STREET EAST ELMHURST NY 11369	08/21/2013	08/21/2018
DOL	NYC		MILANCE HADZIC		22 CALIFORNIA AVE - STE 1 PATERSON NJ 07503	03/11/2015	03/11/2020
DOL	DOL	*****5517	MILLENNIUM PAINTING INC		67 WARD ROAD SALT POINT NY 12578	01/21/2011	01/21/2016
DOL	AG		MOHAMMAD RIAZ		46 RUGBY ROAD WESTBURY NY 11590	11/20/2013	11/20/2018
DOL	NYC	*****2690	MONDOL CONSTRUCTION INC		11-27 30TH DRIVE LONG ISLAND CITY NY 11102	05/25/2011	05/25/2016
DOL	DOL		MORTON LEVITIN		3506 BAYFIELD BOULEVARD OCEANSIDE NY 11572	08/30/2011	08/30/2016
DOL	DOL	*****2737	MOUNTAIN'S AIR INC		2471 OCEAN AVENUE- STE 7A BROOKLYN NY 11229	09/24/2012	09/24/2017
DOL	NYC		MUHAMMAD ZULFIQAR		129-06 18TH AVENUE COLLEGE POINT NY 11356	02/09/2012	02/09/2017
DOL	DOL	*****2357	MUNICIPAL MILLING & MIX-IN-PLACE		9091 ERIE ROAD ANGOLA NY 14006	02/03/2011	02/03/2016
DOL	DOL		MURRAY FORTH		P O BOX 74 EAST GREENBUSH NY 12061	02/28/2012	10/01/2017
DOL	DOL		MUZAFFAR HUSSAIN		C/O ABSOLUTE GENERAL CONT 1129 AVENUE UBROOKLYN NY 11229	01/28/2013	01/28/2018
DOL	NYC	*****1284	NEW AMERICAN RESTORATION INC		22 CALIFORNIA AVE - STE 1 PATERSON NJ 07503	03/11/2015	03/11/2020
DOL	DA	*****6988	NEW YORK INSULATION INC		58-48 59TH STREET MASPETH NY 11378	05/16/2012	05/08/2020
DOL	DOL		NICHOLAS DEGREGORY JR	NJ DEGREGORY & COMPANY	1698 ROUTE 9 GLEN FALLS NY 12801	05/23/2013	05/23/2018
DOL	NYC		NICHOLAS PROVENZANO		147 BROOME AVENUE ATLANTIC BEACH NY 11509	03/03/2014	03/03/2019
DOL	NYC		NICHOLAS PROVENZANO		147 BROOME AVENUE ATLANTIC BEACH NY 11509	03/03/2014	03/03/2019
DOL	DOL		NIKOLAS PSAREAS		656 N WELLWOOD AVE/STE C LINDENHURST NY 11757	09/01/2011	09/01/2016
DOL	DOL	*****5279	NJ DEGREGORY & COMPANY		1698 ROUTE 9 GLEN FALLS NY 12801	05/23/2013	05/23/2018
DOL	DOL		NJ DEGREGORY & SONS CONSTRUCTION		1698 ROUTE 9 GLEN FALLS NY 12801	05/23/2013	05/23/2018
DOL	NYC	*****1968	NORTH AMERICAN IRON WORKS INC		1560 DECATUR STREET RIDGWOOD NY 11385	05/15/2015	05/15/2020
DOL	DOL	*****9198	OCTAGON CO		37-11 35TH AVENUE-2ND FL LONG ISLAND CITY NY 11101	01/08/2013	01/08/2018
DOL	DOL		OKBY ELSAYED		1541 EAST 56TH STREET BROOKLYN NY 11234	05/04/2012	05/04/2017
DOL	NYC		OLIVER HOLGUIN		95-26 76TH STREET OZONE PARK NY 11416	10/12/2011	10/12/2016
DOL	NYC	*****8337	OPTIMUM CONSTRUCTION INC		23-73 48TH STREET LONG ISLAND CITY NY 11103	04/24/2014	04/24/2019
DOL	NYC		ORSON ARROYO		C/O METRO DUCT SYSTEMS 12-19 ASTORIA BOULEVARDLONG ISLAND CITY NY 11102	04/16/2014	06/24/2019
DOL	DOL	*****4546	PAF PAINTING CORP		161 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****5242	PAF PAINTING SERVICES INC	GARDEN STATE PAINTING	157 TIBBETTS ROAD YONKERS NY 10103	03/12/2014	03/12/2019
DOL	DOL		PAF PAINTING SERVICES OF WESTCHESTER INC		C/O SPIEGEL & UTRERA 1 MAIDEN LANE - 5TH FLNEW YORK NY 10038	03/12/2014	03/12/2019
DOL	DOL	*****8802	PAT'S HEATING AND AIR CONDITIONING LTD		P O BOX 371 ROUND LAKE NY 12151	05/12/2014	05/12/2019
DOL	DOL		PATRICIA M RUGGLES		P O BOX 371 ROUND LAKE NY 12151	05/12/2014	05/12/2019
DOL	DOL		PAUL VERNA		C/O AMERICAN STEEL MECHA 693 PAINTER STREETMEDIA PA 19063	02/20/2013	02/20/2018
DOL	DOL	*****9569	PERFORM CONCRETE INC		31 DURANT AVENUE BETHEL CT 06801	07/02/2012	07/02/2017
DOL	NYC		PETER LUSTIG		30 COLUMBUS CIRCLE EASTCHESTER NY 10709	08/21/2012	08/21/2017

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DOL	NYC		PETER TRITARIS		5990 58TH AVENUE MASPETH NY 11378	11/18/2013	11/18/2018
DOL	DOL	*****7914	PRECISION SITE DEVELOPMENT INC		89 EDISON AVENUE MOUNT VERNON NY 10550	10/28/2011	10/28/2016
DOL	DOL	*****2989	PROFESSIONAL ESTIMATING & BUSINESS CORP		157 TIBBETS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****6895	PROLINE CONCRETE OF WNY INC		3090 SHIRLEY ROAD NORTH COLLINS NY 14111	04/19/2011	07/08/2020
DOL	DOL	*****0015	RAMADA CONSTRUCTION CORP		80 SAVO LOOP STATEN ISLAND NY 10309	01/07/2014	01/07/2019
DOL	DOL		RANA A KAHN		1973 81ST ST - SUITE A-5 BROOKLYN NY 11214	01/08/2015	01/08/2020
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP		3 PARK PLACE MIDDLETOWN NY 10940	09/16/2013	09/15/2019
DOL	NYC		RAYMOND PEARSON		P O BOX 957 PORT JEFFERSON STA NY 11776	03/12/2014	03/12/2019
DOL	DOL		REBECCA THORNE		113 N MAPLE AVENUE GREENSBURG PA 15601	02/21/2013	02/21/2018
DOL	DOL		REGINALD WARREN		C/O RAW POWER ELECTRIC 3 PARK CIRCLEMIDDLETOWN NY 10940	09/15/2014	09/15/2019
DOL	DOL		REVOLUTIONARY FLOORS LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL		RHINO CONCRETE LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL		RICHARD WILSON		C/O DUFOUR GROUP INC 353 WEST 56TH STREET #7MNEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL	*****8618	RIEKS CONTRACTING LLC		4804 GAHWILER ROAD AUBURN NY 13021	05/01/2015	05/01/2020
DOL	DOL		ROBBYE BISSESAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL	*****1855	ROBERT D BISHOP JR	ROBERT D BISHOP JR	P O BOX 112 MORRISONVILLE NY 12962	07/15/2014	07/15/2019
DOL	DOL		ROBERT D BISHOP JR		P O BOX 112 MORRISONVILLE NY 12962	07/15/2014	07/15/2019
DOL	NYC		ROBERT FICARELLI		120-30 28TH AVENUE FLUSHING NY 11354	01/14/2011	01/14/2016
DOL	NYC		ROBERT GUIDO		3256 BRUNER AVENUE BRONX NY 10469	07/29/2014	07/29/2019
DOL	DOL		ROBERT L EVANS		128A NORTH STAMFORD ROAD STAMFORD CT 06903	05/23/2013	05/23/2018
DOL	DOL		ROBERT TORDELLA		125 CHAUTAUQUA AVENUE LAKEWOOD NY 14750	06/24/2015	06/24/2020
DOL	DOL		ROCCO ESPOSITO		C/O ROCMAR CONTRACTING CO 620 COMMERCE STREETTHORNWOOD NY 10594	09/24/2012	09/24/2017
DOL	DOL		ROCMAR CONSTRUCTION CORP		620 COMMERCE STREET THORNWOOD NY 10594	09/24/2012	09/24/2017
DOL	DOL	*****7083	ROCMAR CONTRACTING CORP		620 COMMERCE STREET THORNWOOD NY 10594	09/24/2012	09/24/2017
DOL	DOL		ROMEO WARREN		C/O RAW POWER ELECTR CORP 3 PARK PLACEMIDDLETOWN NY 10940	09/16/2013	09/15/2019
DOL	DOL		ROSEANNE CANTISANI		11 TATAMUCK ROAD POUND RIDGE NY 10576	05/04/2012	05/04/2017
DOL	NYC		ROSS J HOLLAND		120-30 28TH AVENUE FLUSHING NY 11354	01/14/2011	01/14/2016
DOL	DOL		ROSS J MUSCOLINO		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	DOL		S & M CONTRACTING LLC		30 MIDLAND AVENUE WALLINGTON NJ 07057	11/05/2010	11/05/2015
DOL	DOL		S & S ELECTRIC		235 BROADWAY SCHENECTADY NY 12306	06/19/2013	06/19/2018
DOL	NYC		SAEED HASAN		4558 BROADWAY #6 NEW YORK NY 10040	08/04/2014	08/04/2019
DOL	DOL	*****4923	SCHENLEY CONSTRUCTION INC		731 WARWICK TURNPIKE HEWITT NJ 07421	06/25/2012	12/11/2017
DOL	DOL		SCOTT LEONARD	GLOBAL TANK CONSTRUCTI ON LLC	P O BOX 1238 SALINA OK 74365	11/28/2012	11/28/2017

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DOL	DOL		SEAKCO CONSTRUCTION COMPANY LLC		128A NORTH STAMFORD ROAD STAMFORD CT 06903	05/23/2013	05/23/2018
DOL	DOL	*****9030	SEAKCO NEW YORK LLC	SEAKCO CONSTRUCTION COMPANY	128A NORTH STAMFORD ROAD STAMFORD CT 06903	05/23/2013	05/23/2018
DOL	DOL		SEAN BURBAGE	C/O SEAN BURBAGE CORP	445 ROOSA GAP ROAD BLOOMINGBURG NY 12721	04/14/2014	04/14/2019
DOL	DOL	*****6586	SEAN BURBAGE CORP		445 ROOSA GAP ROAD BLOOMINGBURG NY 12721	04/14/2014	04/14/2019
DOL	DOL	*****3540	SEVEN STAR ELECTRICAL CONTRACTING CORP		23-24 STEINWAY STREET ASTORIA NY 11105	06/27/2011	06/27/2016
DOL	DOL		SEVEN STAR ELECTRICAL INC		C/O THEONI ATHANASIADIS 1023 COMMACK ROAD DIX HILLS NY 11746	06/27/2011	06/27/2016
DOL	NYC		SHAFIQU L ISLAM		11-27 30TH DRIVE LONG ISLAND CITY NY 11102	05/25/2011	05/25/2016
DOL	NYC		SHAHZAD ALAM		21107 28TH AVE BAYSIDE NY 11360	07/02/2012	07/02/2017
DOL	DOL	*****6904	SIGNING STAR LIMITED LIABILITY COMPANY		5 HANSEN PLACE WAYNE NJ 07470	09/18/2013	09/18/2018
DOL	DOL	*****0667	SNEEM CONSTRUCTION INC		43-22 42ND STREET SUNNYSIDE NY 11104	07/01/2011	07/01/2016
DOL	DOL		SPASOJE DOBRIC		61 WILLET STREET - SUITE PASSAIC NJ 07055	07/09/2010	02/23/2017
DOL	NYC	*****4934	SPHINX CONTRACTING CORP		240 HOME STREET TEANECK NJ 07666	08/04/2014	08/04/2019
DOL	DOL		SPORTSCRAFTERS INC		113 N MAPLE AVENUE GREENSBURG PA 15601	02/21/2013	02/21/2018
DOL	DOL	*****3539	SPOTLESS CONTRACTING	IMPACT INDUSTRIAL SERVICES INC	44 THIELLS-MT IVY ROAD POMONA NY 10970	10/14/2011	10/14/2016
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL		STEFANIE MCKENNA		30 MIDLAND AVENUE WALLINGTON NJ 07057	11/05/2010	11/05/2015
DOL	DOL		STEPHEN BIANCHI		462 LAKEVIEW AVENUE VALHALLA NY 10595	12/16/2013	12/16/2018
DOL	DOL		STEPHEON SHELTON	FANTASTIC PAINTING	493 LANSING ROAD FULTONVILLE NY 12072	11/18/2013	11/18/2018
DOL	DOL		STEVEN CONKLIN		60 COLONIAL ROAD STILLWATER NY 12170	02/15/2011	02/15/2016
DOL	DOL		STEVEN SAGGESE		3005 WYNSUM AVENUE MERRICK NY 11566	08/18/2014	08/18/2019
DOL	DOL		STUART CHAITIN		634 ROUTE 303 BLAUVEY NY 10913	07/26/2012	11/19/2018
DOL	DOL	*****3210	SUPER SWEEP	FMS	4 LEGHORN COURT NEW YORK NY 11746	11/28/2012	11/28/2017
DOL	DOL		SUZANNE G GOLD	C/O GOLDS FLOORING INSTALLATION S INC	25 HAMILTON ROAD MONTICELLO NY 12701	10/16/2013	10/16/2018
DOL	DOL	*****7441	T & T CONCRETE INC		2560 HAMBURG TURNPIKE P O BOX 367 LACKAWANNA NY 14218	07/08/2015	07/08/2020
DOL	DOL	*****9676	T D CONTRACTORS CORP	T D CONTRACTOR S INC	113 N MAPLE AVENUE GREENSBURG PA 15601	02/21/2013	02/21/2018
DOL	DOL		T D CONTRACTORS INC		113 N MAPLE AVENUE GREENSBURG PA 15601	02/21/2013	02/21/2018
DOL	DOL		TAMMY LACITIGNOLA		C/O CATSKILL FENCE INSTAL 5445 ROUTE 32 CATSKILL NY 12414	08/22/2014	08/22/2019
DOL	DOL		TECH-MECHANICAL FAB DC INC		5 PARKER AVENUE POUGHKEEPSIE NY 12601	03/25/2014	03/25/2019
DOL	DOL	*****0887	THE BRINSON PAINTING CORPORATION		72 TAUNTON PLACE BUFFALO NY 14216	04/14/2015	04/14/2020
DOL	DOL	*****4293	THE J OUVINA GROUP LLC		344 SOUNDVIEW LANE COLLEGE POINT NY 11356	11/22/2011	11/22/2016
DOL	DOL		THE THORNE GROUP INC		113 N MAPLE AVENUE GREENSBURG PA 15601	02/21/2013	02/21/2018
DOL	DOL	*****2070	THE UNIVERSAL GROUP OF NEW YORK INC		212 OXFORD WAY SCHENECTADY NY 12309	12/11/2012	09/16/2018
DOL	DOL	*****9243	THE WELCOME MAT PROPERTY MANAGEMENT LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019

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DOL	DOL		THEONI ATHANASIADIS		C/O SEVEN STAR ELECTRICAL 23-24 STEINWAY STREET ASTORIA NY 11105	06/27/2011	06/27/2016
DOL	DOL		THOMAS DESANTIS	DESANTIS ENTERPRISES	161 OSWEGO RIVER ROAD PHOENIX NY 13135	09/24/2013	11/18/2018
DOL	NYC		THOMAS SCARINCI		130-43 92ND AVENUE RICHMOND HILLS NY 11418	11/27/2013	11/27/2018
DOL	DOL		THOMAS TERRANOVA		13 NEW ROAD/SUITE 1 NEWBURGH NY 12550	11/15/2010	11/15/2015
DOL	DOL	*****2734	THREE FRIENDS CONSTRUCTION CORP		986 MADISON AVENUE PATERSON NJ 07501	01/03/2013	01/03/2018
DOL	NYC	*****6253	THUNDER BROTHERS CORP		24 CONGRESS LANE SOUTH RIVER NJ 08882	05/01/2013	05/01/2018
DOL	DOL		TIMOTHY F BARBER		635 LUZERNE ROAD QUEENSBURY NY 12804	09/16/2013	09/16/2018
DOL	NYC		TIMOTHY O'SULLIVAN		C/O SNEEM CONSTRUCTION 4322 42ND STREETSUNNYSIDE NY 11104	07/01/2011	07/01/2016
DOL	NYC	*****1523	TM MECHANICAL CORP		130-43 92ND AVENUE RICHMOND HILLS NY 11418	11/27/2013	11/27/2018
DOL	DOL	*****0600	TOMSON ALLOYS RECYCLING INC		143 FILLMORE AVENUE BUFFALO NY 14210	01/08/2015	01/08/2020
DOL	DOL	*****8176	TOURO CONTRACTING CORP		1541 EAST 56TH STREET BROOKLYN NY 11234	05/04/2012	05/04/2017
DOL	DOL	*****2357	TRAC CONSTRUCTION INC	MUNICIPAL MILLING & MIX -IN- PLACE	9091 ERIE ROAD ANGOLA NY 14006	02/03/2011	02/03/2016
DOL	DOL	*****6914	TRI-COUNTY RESTORATIONS & CONSTRUCTION INC		13 SUMMERSET DRIVE WALLKILL NY 12589	08/22/2014	08/22/2019
DOL	DOL		TRI-COUNTY RESTORATIONS INC		392 ROCK CUT ROAD WALDEN NY 12586	08/22/2014	08/22/2019
DOL	DOL	*****5213	TRIAD PAINTING CO INC		656 N WELLWOOD AVE/STE C LINDENHURST NY 11757	09/01/2011	09/01/2016
DOL	DOL		TROY D CLARKE	ADVANCED METALS	387 RIVERSIDE DRIVE JOHNSON CITY NY 13790	10/01/2012	10/01/2017
DOL	DOL	*****4294	TWT CONSTRUCTION COMPANY INC		13 NEW ROAD/SUITE 1 NEWBURGH NY 12550	11/15/2010	11/15/2015
DOL	DOL		ULIANO AND SONS INC		22 GRIFFEN COURT MILLER PLACE NY 11746	10/26/2010	10/26/2015
DOL	AG	*****6490	UNIVERSAL STEEL FABRICATORS INC		90 JUNIUS STREET BROOKLYN NY 11212	01/23/2014	01/23/2019
DOL	NYC	*****7174	V&R CONTRACTING		P O BOX 957 PORT JEFFERSON STA NY 11776	03/12/2014	03/12/2019
DOL	NYC		VEAP SELA	C/O COLONIAL ROOFING COMPANY INC	247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	DOL	*****3270	VEZANDIO CONTRACTING CORP		530 BEECH STREET NEW HYDE PARK NY 11040	07/02/2012	07/02/2017
DOL	NYC		VICK CONSTRUCTION		21 DAREWOOD LANE VALLEY STREAM NY 11581	12/31/2013	12/31/2018
DOL	NYC		VICKRAM MANGRU	VICK CONSTRUCTI ON	21 DAREWOOD LANE VALLEY STREAM NY 11581	12/31/2013	12/31/2018
DOL	NYC		VINCENT PIZZITOLA		P O BOX 957 PORT JEFFERSON STA NY 11776	03/12/2014	03/12/2019
DOL	DOL		WESLEY J STAROBA		206 TALLY HO COURT SCHENECTADY NY 12303	06/19/2013	06/19/2018
DOL	DOL	*****0078	WESLEY J STAROBA INC	S & S ELECTRIC	235 BROADWAY SCHENECTADY NY 12306	06/19/2013	06/19/2018
DOL	DOL	*****7617	WHITE PLAINS CARPENTRY CORP		P O BOX 309 WHITE PLAINS NY 10603	12/04/2009	05/04/2017
DOL	DOL		WILLIAM CONKLIN		5 PARKER AVENUE POUGHKEEPSIE NY 12601	03/25/2014	03/25/2019
DOL	DOL		WILLIAM MAZZELLA		134 MURRAY AVENUE YONKERS NY 10704	02/03/2014	02/03/2019
DOL	DOL		WILLIAM SCRIVENS		30 MIDLAND AVENUE WALLINGTON NJ 07057	11/05/2010	11/05/2015
DOL	DOL		WILLIAM THORNE		113 N MAPLE AVENUE GREENSBURG PA 15601	02/21/2013	02/21/2018
DOL	DOL		WILLIE BRINSON		72 TAUNTON PLACE BUFFALO NY 14216	04/14/2015	04/14/2020
DOL	NYC	*****5498	XAVIER CONTRACTING LLC		68 GAYLORD ROAD SCARSDALE NY 10583	02/10/2011	02/10/2016
DOL	DOL		YURIY IVANIN		C/O MOUNTAIN'S AIR INC 2471 OCEAN AVENUE-STE 7ABROOKLYN NY 11229	09/24/2012	09/24/2017

EXHIBIT G

**FEDERAL WAGE RATES
DAVIS-BACON ACT**

General Decision Number: NY150017 10/09/2015 NY17

Superseded General Decision Number: NY20140017

State: New York

Construction Types: Building, Heavy, Highway and Residential

County: Westchester County in New York.

BUILDING CONSTRUCTION PROJECTS, RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories), AND HEAVY AND HIGHWAY CONSTRUCTION PROJECTS

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015
1	01/09/2015
2	01/23/2015
3	01/30/2015
4	03/20/2015
5	04/17/2015
6	05/15/2015
7	06/12/2015
8	06/19/2015
9	07/03/2015
10	07/31/2015
11	08/21/2015
12	09/11/2015
13	10/02/2015
14	10/09/2015

ASBE0091-003 05/27/2013

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER (Duties limited to preparation, wetting, stripping, removal, scraping, vacuuming, bagging and disposing of all insulation materials whether they contain asbestos or not from mechanical systems).....	\$ 25.55	9.95

Insulator/asbestos worker
(Includes application of all
insulating materials,
protective coverings,
coatings, and finishes to all
types of mechanical sytems).....\$ 38.00 37.26

BOIL0005-001 01/01/2013

	Rates	Fringes
BOILERMAKER.....	\$ 49.47	33%+22.87+a

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Thanksgiving Day, Memorial Day, Independence Day, Labor Day and Good Friday, Friday after Thanksgiving, Christmas Eve Day and New Year's Eve

* BRNY0001-003 07/01/2015

	Rates	Fringes
Pointer, cleaner and caulker.....	\$ 40.43	29.45

* BRNY0004-001 07/01/2015

	Rates	Fringes
MARBLE MASON.....	\$ 56.53	30.29

* BRNY0005-006 06/01/2015

HEAVY & HIGHWAY CONSTRUCTION

	Rates	Fringes
BRICKLAYER Bricklayers, Stone Masons, Cement Masons, Plasterers, Pointers, Caulkers and Cleaner.....	\$ 40.43	29.45

* BRNY0005-007 06/01/2015

BUILDING/RESIDENTIAL CONSTRUCTION

	Rates	Fringes
Bricklayer, Cement Mason, Plasterer & Stonemason.....	\$ 39.93	29.45

* BRNY0007-001 07/01/2015

	Rates	Fringes
TERRAZZO FINISHER.....	\$ 49.14	31.49
TERRAZZO WORKER/SETTER.....	\$ 50.75	31.49

* BRNY0020-001 07/01/2015

	Rates	Fringes
MARBLE FINISHER.....	\$ 45.08	29.65

* BRNY0024-001 07/01/2015

	Rates	Fringes
BRICKLAYER		
MARBLE POLISHERS.....	\$ 39.50	23.25

* BRNY0052-001 06/01/2015

	Rates	Fringes
Tile Layer.....	\$ 47.15	24.74

BRNY0088-001 06/01/2014

	Rates	Fringes
TILE FINISHER.....	\$ 40.78	27.86

CARP0279-001 07/01/2014

	Rates	Fringes
Carpenters:		
Building.....	\$ 38.36	33.08
Heavy & Highway.....	\$ 38.36	33.08
Residential.....	\$ 30.68	26.46

CARP0740-001 07/01/2015

	Rates	Fringes
MILLWRIGHT.....	\$ 49.50	51.31

CARP1556-007 07/01/2015

	Rates	Fringes
Diver Tender.....	\$ 45.47	45.95
Diver.....	\$ 63.82	45.95

CARP1556-009 07/01/2015

	Rates	Fringes
Dock Builder & Piledrivermen.....	\$ 50.50	45.95

CARP1556-011 07/01/2015

	Rates	Fringes
Carpenters:		
TIMBERMEN.....	\$ 45.60	45.97

CARP2287-001 07/01/2015

	Rates	Fringes
Carpenters:		
Soft Floor Layers.....	\$ 50.50	45.18

ELEC0003-003 04/24/2014

	Rates	Fringes
ELECTRICIAN (Teledata Technician).....	\$ 50.75	40.081

a. \$2.00 per hour not to exceed \$14.00 per day.

ELEC1249-001 05/04/2015

	Rates	Fringes
ELECTRICIAN (LIGHTING AND TRAFFIC SIGNAL WORK Including any and all Fiber Optic Cable necessary for Traffic Signal Systems, Traffic monitoring systems and Road Weather Information systems)		
Flagman.....	\$ 27.58	7%+20.50
Ground Digging Machine Operator.....	\$ 41.37	7%+20.50
Ground Truck Driver.....	\$ 36.78	7%+20.50
Tractor, Trailer Unit.....	\$ 39.07	7%+20.50
Lineman & Technician.....	\$ 45.97	7%+20.50
Mechanic.....	\$ 36.78	7%+20.50

FOOTNOTE:

a. PAID HOLIDAYS: New Years Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, President's Day, Good Friday, Decoration Day, Election Day for the President of the Untied States and Election Day for the Governor of the State of New York provided the employee works two days before and two days after the holiday

ELEC1249-006 05/04/2015

	Rates	Fringes
ELECTRICIAN (LINE CONSTRUCTION)		
Substation and switching structures pipetype cable, underground fuilnd and gas filled transmission conduit and cable installation, fiber optic ground wire, fiber optic shield wire or any other like product having ground		

protection or fiber optic capabilities, maintenance jobs or projects; railroad catenary installation and maintenance bonding of rails; Overhead & underground distribution work & Maintenance; Overhead and under- ground transmission line work:

Cable Splicer.....	\$ 54.35	7%+20.50
Flagman.....	\$ 29.65	7%+20.50
Groundman digging machine operator.....	\$ 44.47	7%+20.50
Groundman truck driver (tractor trailer unit).....	\$ 42.00	7%+20.50
Groundman truck driver;....	\$ 39.53	7%+20.50
Lineman & Technician.....	\$ 49.41	7%+20.50
Mechanic.....	\$ 39.53	7%+20.50

PAID HOLIDAYS:

a. New Year's Day, President's Day, Memorial Day, Good Friday, Independence Day, Labor Day, Thanksgiving Day, Christmas Day, and Election Day for the President of the United States and Election Day for the Governor of New York State, provided the employee works two days before or two days after the holiday.

ELEC1249-009 01/01/2014

	Rates	Fringes
ELECTRICIAN (LINE CONSTRUCTION)		
TELEPHONE, CATV FIBEROPTICS CABLE AND EQUIPMENT		
Cable Splicer.....	\$ 29.12	3%+4.43
Groundman.....	\$ 12.98	3%+4.43
Installer Repairman-Teledata Lineman/Technician-Equipment Operator.....	\$ 27.64	3%+4.43

ELEV0001-002 03/17/2013

	Rates	Fringes
ELEVATOR MECHANIC		
Elevator Constructor.....	\$ 57.01	27.605+a+b
Modernization and Repair....	\$ 45.14	27.455+a+b

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day, Good Friday, President's Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

b. PAID VACATION: An employee who has worked less than 5 years shall receive vacation pay credit on the basis of 4% of his hourly rate for all hours worked; an employee who has worked 5 to 15 years shall receive vacation pay credit on the basis of 6% of his hourly rate for all hours worked; an employee who has worked 15 or more years shall receive vacation pay credit on the basis of 8% of his hourly rate for all hours worked.

ELEV0138-003 01/01/2015

WESTCHESTER COUNTY (Towns of Bedford, Cortland, Lewisboro, Mt. Kisco, North Salem, Pound Ridge, Somers, and Yorktown)

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 52.52	28.385+a+b

FOOTNOTE:

a. Vacation: 6%/under 5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.

b. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

ENGI0137-005 03/04/2013

BUILDING & RESIDENTIAL CONSTRUCTION

	Rates	Fringes
Power equipment operators:		
GROUP 1-A.....	\$ 48.17	25.87+a
GROUP 1-B.....	\$ 44.35	25.87+a
GROUP 2-A.....	\$ 46.45	25.87+a
GROUP 3-A.....	\$ 44.73	25.87+a
GROUP 3-B.....	\$ 42.55	25.87+a
GROUP 4-A.....	\$ 44.27	25.87+a
GROUP 4-B.....	\$ 37.34	25.87+a
GROUP 5.....	\$ 40.31	25.87+a
GROUP 5-A.....	\$ 50.57	25.87+a
GROUP 5-B.....	\$ 38.21	25.87+a
GROUP 6.....	\$ 40.08	25.87+a

NOTES: Hazmat: 20% above regular rate
Pumping operation Premium .50

Crane Operators (100-149 ft) 2.00

Crane Operators (149 ft +) 3.00

Loader Operators (over 5 cu y) .50

Shovel Operators (over 4 cu yd) 1.00

FOOTNOTE:

a. New Years Day, Memorial Day, Independence Day, Labor Day Thanksgiving Day, Christmas Day, plus Lincoln's Birthday, Washington's Birthday, Good Friday, Columbus Day, November Election Day, Veteran's Day.

POWER EQUIPMENT OPERATORS CLASSIFICATION

GROUP 1-A: Carrier- trailer horse; concret-portable hoist; crane & hoist engineer-steel (concrete, material, super structure sub- structure); derrick (stone-steel); elevator & cage; hoist- single/double or triple drum; hoist-portable mobile unit; hoist engineer-concert (crane-derrick-mine hoist); hoist engineer- material; overhead crane; power house plant; telephies (cableway); whirly; maintenance engineer; Lull hilift or similar; hydraulic crane 25 ton and over; cherry picker 25 tons and over; backhoe Oliver 88; fordson; dynahoe; dual purpose and similar machines; Barber Green Loader-euclid loader or similar type; conway or similar mucking macking machines; dragline; gradall; shovel; backhoe etc. (crawler or truck); front end loaders; hydraulic boom; jersey spreader; lift slab console; letournequ or tounapull (scrapers over 20 yds struck); mucking machines; pavement breaker (air ram); paver (concrete); road boring machine; road mix machines; ross carrier and similar machines; post hole digger; shovel (tunnels); side boom; spreader (asphalt); scoopmobile-tractor-shovel over 1 1/2 yds. trenching machines vermeer concrete saw trencher and similar; tractor type demolition equipment; winch truck (a frame); hydraulic crane over 10 ton up to 25 ton); cherry picker over 10 ton up to 25 ton)

GROUP 1-B: Compressor (steel erection); pulse meter and push button buzz box; elevator; mechanic (outside) all types; welder; scrapers 20 yds struck and under; machine pulling sheep's foot roller; vibratory rollers; roller 4 tons and over.

GROUP 2-A: Compactor self-propelled; grader; bulldoze D7 and similar tractors with a draw bar horsepower of 100 or over; bulldozer D6 and under; welder; scraper 20 yds struck and under; machine pulling sheep's foot roller; vibratory rollers.

GROUP 3-A: Asphalt plant; boiler (high pressure); concrete mixing plants; concrete pump; firemen; forklift; forklift (electric); joy drill or similar tractor drilling machine; loader - 1 1/2 yards and under; locomotive (all sizes); mixer concrete - 21E and over; portable asphalt plant; portable batch plant; portable crusher; quarry master; stone crusher; well drilling machine and well point system; cherry picker under 10 tons; hydraulic crane under 10 tons; concert buffy; one yard an up ride on dumper (benford or similar).

GROUP 3-B: Compressor over 125 cu. feet; conveyor belt machine regardless of size; lighting unit (portable & generator); welding machine (steel erection and excavation); and compressor plant; stud machine; ladder hoist.

GROUP 4-A: Air tractor drill; batch plant; bending machine; concrete breaker; concrete spreader; curb cutter machine; farm tractor (all types); finishing machine-concrete; hepavac clean air machine (all similar types: removal of asbestos etc.); material hopper-sand-stone-cement; mixer-concrete-under 21E; mulching grass spreader; pump-gypsum, etc., pump-plaster-grout -fireproofing; shop mechanic (not employed on job site); roller under 4 ton; spreading and fine grading machine; steel cutting machine; syphon pump-air-steam; tar joint machine; turbo jet burner or similar equipment; vibrator (1 to 5); fine grading machine; roof hoist (tugger hoist); television cameras-water- sewer-gas-etc.

GROUP 4-B: Compressor to 125 feet; dust; dust collector; heater all types; pump; pump station (water and sewer); steam jenny; sweeper; chipper; mulcher.

GROUP 5: Motorized roller (walk behind)

GROUP 5-A: Master Mechanic

GROUP 5-B: Utility Man

GROUP 6: Warehouse Man

ENGI0137-006 03/04/2013

HEAVY & HIGHWAY

	Rates	Fringes
Power equipment operators:		
GROUP 1.....	\$ 53.38	25.87+a
GROUP 1-A.....	\$ 47.17	25.87+a
GROUP 1-B.....	\$ 49.65	25.87+a
GROUP 2-A.....	\$ 45.21	25.87+a
GROUP 2-B.....	\$ 46.60	25.87+a
GROUP 3.....	\$ 44.44	25.87+a
GROUP 4-A.....	\$ 40.48	25.87+a
GROUP 4-B.....	\$ 34.89	25.87+a
GROUP 5.....	\$ 46.45	25.87+a
GROUP 5-A-1.....	\$ 49.89	25.87+a
GROUP 5-A-2.....	\$ 60.34	25.87+a
GROUP 5-A-3.....	\$ 58.30	25.87+a
GROUP 5-A-4.....	\$ 54.73	25.87+a
GROUP 5-A-5.....	\$ 46.24	25.87+a

POWER EQUIPMENT OPERATORS CLASSIFICATIONS (HEAVY & HIGHWAY)

GROUP 1: Boom Truck; Cherry Picker; Clamshell; Crane, (Crawler, Truck); Dragline; Rough Terrain Crane

GROUP 1-A: Auger; Auto Grader; Dynahoe and Dual purpose and similar machines; Boat Captain; Boring Machine (all types); Bull Dozer-all sizes; Central Mix Plant Operator; Chipper-all types; Close circuit t.v.; Compactor with Blade; Concrete Portable Hoist; C.M.I. or similar; Conway

or similar mucking machines; Gradall, Shovel Backhoe, etc. Grader; Derrick, (Stone- Steel; Elevator & cage, materials or passengers; Front end loaders over 1 1/2 yds.; Hoist Single, Double, Triple Drum, Hoist Portable Mobile Unit; Hoist Engineer-Concrete (Crane-Derrick-Mine Hoist); Hoist Engineer-Material, Hydraulic Boom; Letourneau or Tournapull (Scrapers over 20 yds. struck); Log Skidder; Movable Concrete Barrier Transfer & Transport Vehicle; mucking machines; overhead crane; paver (concrete); pulsemeter; push button (buzz box) elevator; road mix machines; Robot Hammer (brock or similar), Ross carrier and similar machines; shovels (tunnels); side boom; Slip Form Machine; spreader (asphalt); scoopmobile-tractor-shovel over 1 1/2 yards; trenching machines; telephies- vermeer concrete saw trencher and/or similar; tractor-type demolition equipment, Whirly

GROUP 1-B: Road Paver, Asphalt

GROUP 2-A: Ballast Regulators; Compactor self-propelled; Cow Tracks; Fusion Machine; Rail Anchor Machines; Roller 4 ton and over; Scrapers - 20 yards struck; Switch Tampers; Vibratory roller, etc.

GROUP 2-B: Mechanic (outside) all types

GROUP 3-A: Air tractor drill; asphalt plant; batch plant; boiler (high pressure; concrete breaker; concrete pump concrete spreader; curb cutter machine; farm tractor (all types); finishing machine (concrete); fine grading machine; fireman; forklift; forklift (electric); joy drill or similar tractor drilling machine; loader - 1 1/2 yards and under; locomotive (all sizes), maintenance engineer; machine pulling sheeps foot roller; material hopper; mixer concrete - 21-E and over; mulching grass spreader; portable asphalt plant, portable batch plant, portable crusher; powerhouse plant; quarry master; roller under 4 ton; spreading and fine grading machine; steel cutting machine; stone crusher; sweeper; turbojet burner or similar; well drilling machine ; winch truck "A" frame. John Henry Drill or similar.

GROUP 4-A: Service men (fuel or grease truck).

GROUP 4-B: Oiler; Compressor - compressor plant; paint compressor-steel erection; conveyor belt machine; lighting unit (portable & generator); oiler; pumps - pump station-water-sewer- gypsum- plaster, etc.; roller-motorized (walk-behind); welding machine (steel erection excavation); well point system; bending machine; dust collector; mixer - concrete under 21-E; heater all types; steam jenny; syphon pump-air-steam; tar joint machine; vibrator (1 to 5); Compressor Truck Mounted (2-6)

GROUP 5: Oiler

GROUP 5-A-1: Master Mechanic

GROUP 5-A-2: Engineer - 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 (except for pile rigs).

GROUP 5-A-3: Engineer-- Pile Driver

GROUP 5-A-4: Hoist Engineer- Steel -Sub Structure

GROUP 5-A-5: Jersey-spreader, pavement breaker (air ram);
Post Hole Digger

NOTES:

Loader Operator (over 5 cu yds)	.50
Shoval Operators (over 4 cu yd)	1.00
Hazmat premium over regular rate	20%

CRANES:

100 ft- 149 ft: receive \$2.00 more than Group 1 rate
149 ft and over receive \$300 more than Group 1 rate

FOOTNOTE:

a. PAID HOLIDAYS: New Year's Day; Lincoln's Birthday; Good Friday; Memorial Day; Independence Day; Labor Day; Veterans Day; Columbus Day; November Election Day; Thanksgiving Day; and Christmas Day

IRON0040-001 07/01/2015

WESTCHESTER COUNTY

	Rates	Fringes
IRONWORKER, STRUCTURAL.....	\$ 48.75	67.34

IRON0046-003 07/01/2014

	Rates	Fringes
IRONWORKER METALLIC LATHERS AND REINFORCING IRONWORKERS.....	\$ 40.60	30.56

IRON0197-001 06/01/2013

	Rates	Fringes
IRONWORKER STONE DERRICKMAN.....	\$ 41.00	36.57

IRON0580-001 07/01/2015

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 43.20	47.42

LABO0060-002 07/01/2015

HEAVY/HIGHWAY

Rates	Fringes

Laborers:

GROUP 1.....	\$ 39.20	19.90+a
GROUP 2.....	\$ 37.85	19.90+a
GROUP 3.....	\$ 37.45	19.90+a
GROUP 4.....	\$ 37.10	19.90+a
GROUP 5.....	\$ 36.75	19.90+a
GROUP 6.....	\$ 30.40	19.90+a
GROUP 7.....	\$ 38.75	19.90+a
SHAFT AND TUNNEL IN FREE		
AIR		
GROUP 1.....	\$ 44.15	25.60+a
GROUP 2.....	\$ 46.15	25.60+a
GROUP 4.....	\$ 52.15	25.60+a

LABORERS CLASSIFICATIONS (HEAVY/HIGHWAY):

GROUP 1: Blasters.

GROUP 2: Burner, Jumbo Driller, Joy Driller, Wagon Driller, Air Track Driller, Hydraulic Driller, Concrete Form Aligner, Concrete Form and Curb Form Highway (Steel), Asphalt Screedman, Asphalt Raker.

GROUP 3: Asphalt Curb Machine Operator, Jeeper Operator, Pavement Breaker Operator, Power Saw Operator, Jack Hammer Driller. All types of pneumatic tools gasoline driller, concrete saw, gunniting, railroad spike puller and sandblasting, pipe layer, deck winches on scows, power buggy operator, power wheelbarrow operator.

GROUP 4: General concrete laborers-anything pertaining to concrete, aggregate or concrete material handling, puddlers, asphalt worker, rock scalers, vibrator operator, bit grinder, concrete grinder, air tampers and all tampers not covered by any other classification, form pin puller, pumps and their operation, service of air power, epoxy and waterproofing worker, fine grade person between forms, barco rammer, guard and guide rail and link fence, steel kings.

GROUP 5: Common laborers, signal person and pit person, truck spotters, powder person, landscape and nursery person, dump person.

GROUP 6: Flagperson

GROUP 7: Asbestos and Toxic Waste laborer

SHAFT AND TUNNEL IN FREE AIR CLASSIFICATIONS

GROUP 1: Outside laborers

GROUP 2: Blaster, Concrete and form setters, drill runners, air tuggers, chippers, pneumatic tools, and source of airpower, pumps and their operations, vibrator operators, Puddlers, Chuck tenders, nippers, concrete laborers tunnel sewer and water pipeliners, boring, Laborers, Powder carriers, signalmen, and Brakemen

GROUP 4: Miners

FOOTNOTE: a. PAID HOLIDAYS: New Year's Day, Lincoln's Birthday, Washington's Birthday, Good Friday, Memorial Day, Independence Day, Labor Day, Columbus Day, November Election Day, Veterans' Day, Thanksgiving Day and Christmas Day.

LABO0235-001 05/01/2014

BUILDING

	Rates	Fringes
LABORER.....	\$ 30.56	24.00

LABO0235-002 05/01/2013		

RESIDENTIAL

	Rates	Fringes
LABORER.....	\$ 26.80	19.55

PAIN0009-003 11/01/2014		

	Rates	Fringes
PAINTER		
GLAZIERS.....	\$ 42.85	27.09
Painters, Paperhanger, Drywall Finishers & Lead Abatement Worker.....	\$ 41.75	20.87
Spray, Scaffold, Sandblasting.....	\$ 42.50	21.87

PAIN0806-001 10/01/2014		

	Rates	Fringes
Painters:		
Structural Steel and Bridge.	\$ 48.75	35.63

PLUM0021-003 05/01/2014		

	Rates	Fringes
Plumber and Steamfitter		
Zone 1.....	\$ 51.66	28.16

ROOF0008-003 07/01/2014		

	Rates	Fringes
ROOFER.....	\$ 40.70	25.14

SFNY0669-002 04/01/2015		

	Rates	Fringes
SPRINKLER FITTER.....	\$ 41.47	21.30

SHEE0038-001 07/01/2014		

	Rates	Fringes
Sheet metal worker.....	\$ 43.41	31.71

TEAM0456-001 07/01/2014		

HEAVY & HIGHWAY CONSTRUCTION

	Rates	Fringes
Truck drivers:		
GROUP 1.....	\$ 41.97	23.42
GROUP 2.....	\$ 39.22	23.42
GROUP 3.....	\$ 39.67	23.42
GROUP 4.....	\$ 39.84	23.42
GROUP 5.....	\$ 39.34	23.42
GROUP 6.....	\$ 40.22	23.42
GROUP 7.....	\$ 40.72	23.42
GROUP 8.....	\$ 41.09	23.42
GROUP 9.....	\$ 41.04	23.42
GROUP 10.....	\$ 41.22	23.42
GROUP 11.....	\$ 40.97	23.42

Hazardous/Toxic Waste - An additional 20% of the basic hourly wage rate set forth in this wage determination.

CLASSIFICATION DESCRIPTIONS

GROUP 1: Lowboy (carrying equipment)
 GROUP 2: Straight jobs: 6-Wheeler, 10-Wheeler, A-Frame Trucks (inside cab), Winch Truck (inside cab), Dynamite Truck, Seeding Truck, Mulching Truck, Agitator Truck, Water Truck, Cement Trucks (all types), Suburbans, Station Wagons, Cars, Pickups.
 GROUP 3: Fuel and tire trucks.
 GROUP 4: Tractor trailers (all types)
 GROUP 5: 14 Wheeler
 GROUP 6: Athey wagon, Belly dumps, Articulated Dumps, Trailer wagons.
 GROUP 7: Darts.
 GROUP 8: RXS
 GROUP 9: Off Road Equipment (Under 40 Tons): Euclid
 GROUP 10: Off Road Equipment (Over 40 Tons) Euclid, DJB
 GROUP 11: Off Road Equipment (Under 40 Tons) DJB

a. PAID HOLIDAYS: New Year's Day, Lincoln's Birthday, President's Day, Decoration Day, Independence Day, Labor Day, November Election Day, Thanksgiving Day, Day after Thanksgiving and Christmas Day, provided employee works two or more days in the calendar week in which the holiday falls.

PAID VACATION: 4 weeks paid vacation after 20 years of service and 30 days of employment in current contract year; 3 weeks after 10 years of seniority service; 3 weeks after 10 years and 60 days of employment in contract year, 3 weeks and 1 day after 16 years of seniority service, 3 weeks and 2 days after 17 years of seniority service; 3 weeks and 3 days after 18 years of seniority service; 3 weeks and 4 days after 19 years of seniority service; The third week and every additional day shall be granted to employee in the calendar year in which he completes his tenth or other years of seniority service; 2 weeks after 130 days of employment in the calendar year; 2 weeks after 5 years and 90 days seniority service in calendar year; 1

week and 1 additional day for each additional 18 days of employment not exceeding 10 days in any one calendar year after 90 days of employment. Casual employees 1 day for every 18 days of employment. An employee who does not qualify for vacation shall be paid pro rata on a daily basis. Holiday shall be counted as days worked for vacation benefits.

LEGAL SERVICES FUND: Employer shall contribute \$.20 to the fund on the same basis for all hours paid to employees in the form of holiday pay or vacation pay. In addition to the benefits paid for Health-Welfare and Pension for up to 40 hours worked an additional \$.25 is paid for each hour worked. The employer shall grant 3 calendar days off without loss of pay to an employee who has death in his/her immediate family, inclusive of the day of the funeral.

 WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
 =====

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

 The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate

changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial

contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

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CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such

construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

- c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the

Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to

complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners,

employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 - 1. A Field Order;
 - 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 - 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 - 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer’s Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and

contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

- c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the

consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is

responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly

licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

- a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds

and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and “Or-Equals”*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or-equal” item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *“Or-Equal” Items:* If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements

for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

- a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
- b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;

2) will state:

- a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
- b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
- c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

- a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
- 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of

Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the

Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas:

- 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full

responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall

take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures:

1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of

each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be

affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of

property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

- c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
- d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
 - D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
 - E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
 - F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the

parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

- 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other

arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

- b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
- 2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
- 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive

certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for

Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 Final Completion Delayed

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 Waiver of Claims

- A. The making and acceptance of final payment will constitute:
 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or

remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may,

upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC C-700 (2007 Edition). All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated herein, which are applicable to both the singular and plural thereof.

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

SC-1.01 *Defined Terms*

SC-1.01 Modify existing definitions as follows:

3. Replace the phrase "acceptable to Engineer" in Paragraph 1.01.A.3 of the General Conditions with the phrase "furnished by the Engineer"
11. Replace the phrase "concerning the Work" in Paragraph 1.01.A.11 with the phrase "portions of Work assigned to the specific Contractor".
13. Replace the phrase "completion of the Work" in Paragraph 1.01.A.13 with the phrase "completion of the portions of the Work assigned to the specific Contractor".
15. Replace Paragraph 1.01.A.15 in its entirety with the following:

Contractor – All individuals or entities with whom the Owner has entered into an Agreement for portions of Work described in the Contract Documents. Work not assigned to a specific Contractor shall be the responsibility of all Contractors.

ARTICLE 2 - PRELIMINARY MATTERS

SC-2.02 *Copies of Documents*

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following in its place:

- A. Owner shall furnish to Contractor up to three printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

SC-2.02 In Paragraph 2.02.A, replace "up to ten" with "up to three."

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01 *Intent*

SC-3.01 Add the following new paragraph immediately after Paragraph 3.01.C:

- D. Contractor Documents are written in the imperative mood. When direction is given, it shall be understood that the direction is given to Contractor. For example, the phrase "Provide two pumps" shall be understood to mean "Contractor shall provide two pumps."

This document has been modified from its original form as an EJCDC document and the user did not highlight the modification. You are encouraged to read the document carefully and consult Legal Counsel prior to its execution.

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SUPPLEMENTARY CONDITIONS

SC-3.03 *Reporting and Resolving Discrepancies*

SC-3.03 Add the following new paragraph immediately after Paragraph 3.03.B.1.b:

2. In determining Contract Price with respect to a conflict, error, or discrepancy within the Contract Documents, the Contract Documents shall be given precedence in the following order with Change Orders being the highest precedence:
 1. Change Orders
 2. Work Change Directives
 3. Field Orders
 4. Agreement
 5. Addenda
 6. Laws and Regulations
 7. Supplementary Conditions
 8. General Conditions
 9. Drawings
 10. Specifications
 11. [Owner's Standard Details]
 12. Bid Form

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.02 *Subsurface and Physical Conditions*

SC-4.02 Add the following new paragraphs immediately after Paragraph 4.02.B:

- C. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) are known to Owner:
 1. Drawings dated May 1968, prepared by Westchester County Department of Public Works, Division of Engineering, entitled: "Road Plan and Profile Sta. 0+00 to Sta. 15+00," consisting of one sheet numbered 43-29A-6-35.
 - a. All of the information in such drawings constitutes "technical data" on which Contractor may rely.
- E. The reports and drawings identified above are not part of the Contract Documents, but the "technical data" contained therein upon which Contractor may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference. Contractor is not entitled to rely upon any other information and data known to or identified by Owner or Engineer.
- F. Copies of reports and drawings identified in SC-4.02.C and SC-4.02.D that are not included with the Bidding Documents may be examined at GHD, 150 Grand Street, White Plains, NY 10601 during regular business hours.

SC-4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

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- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

ARTICLE 5 - BONDS AND INSURANCE

SC-5.04 *Contractor's Liability Insurance*

SC-5.04 Add the following new Paragraphs immediately after paragraph 5.04.B:

- C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:
1. Workers' Compensation, and related coverages under paragraphs 5.04.A.1 and A.2 of the General Conditions:
 - a. State: Statutory
 - b. Applicable Federal (e.g., Longshoreman's): Statutory
 - c. Employer's Liability: \$500,000
 2. Contractor's General Liability under paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody, and control of Contractor:
 - a. General Aggregate: \$2,000,000
 - b. Products - Completed Operations Aggregate: \$1,000,000
 - c. Personal and Advertising Injury: \$1,000,000
 - d. Each Occurrence (Bodily Injury and Property Damage): \$1,000,000
 - e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.
 - f. Excess or Umbrella Liability
 - 1) General Aggregate: \$3,000,000
 - 2) Each Occurrence: \$3,000,000
 3. Automobile Liability under paragraph 5.04.A.6 of the General Conditions:
 - a. Bodily Injury:
Each Person \$1,000,000
Each Accident \$1,000,000
 - b. Property Damage:
Each Accident \$1,000,000

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- c. Combined Single Limit of: \$1,000,000
4. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:
- a. Bodily Injury:
- | | |
|------------------|-------------|
| Each Accident | \$1,000,000 |
| Annual Aggregate | \$2,000,000 |
- b. Property Damage:
- | | |
|------------------|-------------|
| Each Accident | \$1,000,000 |
| Annual Aggregate | \$2,000,000 |

SC-5.06 *Property Insurance*

SC-5.06 Delete Paragraph 5.06.B and replace with the following:

- B. Contractor shall purchase and maintain equipment breakdown, and any other additional property insurance required by Laws and Regulations, which insurance will include the interest of Owner, Contractor, Subcontractors, Engineer, and Engineer's Consultants listed herein as additional insureds, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

SC-6.02 *Labor; Working Hours*

SC-6.02. Add the following new Paragraphs immediately after Paragraph 6.02.B:

- C. Normal working hours are defined as 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding Holidays. The following are considered Holidays during which work at the Site is not allowed:
- New Year's Day
 - Memorial Day
 - Independence Day
 - Labor Day
 - Thanksgiving
 - Day after Thanksgiving
 - Christmas
- D. Should Contractor's working hours extend outside normal working hours, any and all costs for weekend, Holiday, and/or on Site overtime services of Engineer's personnel, including but not limited to direct salaries, fringe benefits, overhead and profit, administration and supervision, incurred by Owner, will be the sole obligation of Contractor. The overtime rates shall be 1.5 times the salary rate per hour for a representative of the Client and for representative of Engineer. In addition, Contractor shall pay for all travel costs for the above parties to reach the Site on weekends, Holidays, and/or after hours work.

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SC-6.05 *Substitutes and "Or Equals"*

SC-6.05 Add the following subparagraph immediately after Subparagraph 6.05.A.1.b:

- c. Contractor provides a line-by-line comparison of the proposed product to the specified product. Line-by-line comparison shall not only include all specified features, but shall also include all other design and/or manufacturing differences between the proposed product and the specified product. Line-by-line comparison shall show no significant design or manufacturing differences that, in the Engineer's opinion, could result in lesser quality, performance, or reliability of the proposed product compared to the specified product.

SC-6.05.A.2. Add the following subparagraph immediately after Subparagraph 6.05.A.2.d of the General Conditions:

- e. If the substitute item requires modifications to the structures, piping, layouts, etc., detailed on the Drawings or described in the Contract Documents, the application shall also include details of proposed modifications necessary to accommodate the substitute item. Such details shall include scaled layouts, dimensions, and other pertinent information to enable Engineer to evaluate the entire application. If the substitute item and proposed modifications are approved, Contractor, at no additional cost to Owner, shall do all work necessary to make such modifications and absorb all costs of any related changes imposed on other contractors. Final details of such modifications shall be prepared and submitted for approval by Contractor in accordance with Specification Section 01300, Submittals.

SC-6.05.A. Add the following paragraph immediately after Paragraph 6.05.A.2 of the General Conditions:

3. Time Constraints: All applications for use of substitutes or 'or equal' items shall be submitted to Engineer within 90 days of the Effective Date of the Agreement. No applications will be considered thereafter unless Contractor produces satisfactory evidence that the specified item is no longer manufactured or is unavailable for the Project.

SC-6.05.C. Add the following subparagraph after Paragraph 6.05.C of the General Conditions:

1. In order to aid Engineer in determining the equality of a proposed 'or equal' or substitute item (when compared to the item actually specified), Contractor shall arrange for the performance of any tests requested by Engineer. The nature, extent, tester and supervisions of such tests including engineering costs, shall be borne by Contractor. Certified test results shall be mailed directly to Engineer for all tests requested.

SC-6.08 *Permits*

SC-6.08.A. Add the following subparagraph to Paragraph 6.08.A of the General Conditions:

1. Owner will obtain the following permits in connection with this Project:
 - Building Permit from the Town of White Plains

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Contractor is required to comply with all requirements of permits imposed upon Owner in the same manner required by Owner.

SC-6.10 *Taxes*

SC-6.10 Add a new Paragraph immediately after Paragraph 6.10.A:

- B. Owner is exempt from payment of sales and compensating use taxes of the State of [insert name of state where Project is located] and of cities and counties thereof on all materials to be incorporated into the Work.
 - 1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
 - 2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC-6.16 *Emergencies*

Add the following paragraph after Paragraph 6.16.A of the General Conditions:

- B. Contractor shall designate one person to respond to emergencies and act on the Contractor's behalf during off-work hours at the Site. The person's name, address, and telephone number shall be provided to Owner during the preconstruction conference and the designated person shall be on call during off-work hours. Response time shall not exceed one hour after notification is given by Owner and/or Engineer that an emergency exists at the Site.

SC-6.17 *Shop Drawings and Samples*

SC-6.17.C.2 Replace "or specific written certification" with "certifying".

SC-6.17.D.1 In the first sentence of Paragraph 6.17.D.1, replace "in accordance with the Schedule of Submittals acceptable to Engineer" with "in accordance with Specification Section 01300, Submittals".

SC-6.17 Add the following new paragraphs immediately after Paragraph 6.17.E:

- F. Furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than [three] submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, Samples, or other items requiring approval. Owner will deduct costs for such services from progress payments made to Contractor.
- G. In the event that Contractor requests a change of a previously approved item, OWNER will deduct costs for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

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ARTICLE 8 - OWNER'S RESPONSIBILITIES

SC-8.09 *Limitations on Owner's Responsibilities*

Add the following paragraph immediately after Paragraph 8.09.A of the General Conditions:

- B. Owner will let other direct Contracts and will have authority and responsibility for coordination of the various contractors. The extent of Owner's responsibilities under this arrangement are set forth in paragraph SC-7.02.A of the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.03 *Project Representative*

SC-9.03 Add the following new paragraphs immediately after Paragraph 9.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:
 - 1. *Schedules:* Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.
 - 2. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
 - 3. *Liaison:*
 - a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
 - 4. *Interpretation of Contract Documents:* Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
 - 5. *Shop Drawings and Samples:*
 - a. Record date of receipt of Samples and approved Shop Drawings.

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- b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
- 6. *Modifications:* Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
- 7. *Review of Work and Rejection of Defective Work:*
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 8. *Inspections, Tests, and System Startups:*
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
- 9. *Records:*
 - a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - b. Maintain records for use in preparing Project documentation.
- 10. *Reports:*
 - a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and Sample submittals.
 - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

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- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.
 - 11. *Payment Requests:* Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
 - 12. *Certificates, Operation and Maintenance Manuals:* During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
 - 13. *Completion:*
 - a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.
 - b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.
- C. The RPR shall not:
- 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents.
 - 5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

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6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

(No Amendments to General Conditions.)

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

SC-11.01 *Cost of the Work*

SC-11.01.A.5.c. Delete Paragraph 11.01.A.5.c in its entirety and insert the following in its place:

- c. Construction Equipment and Machinery
 - 1) Rentals of all construction equipment and machinery, and the parts thereof in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the [cite the rate book appropriate for the Project]. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.

SC-11.01.D. Add the following to the end of Paragraph 11.01.D of the General Conditions:

When requested by Engineer, Contractor shall identify sources used to determine rental rates of equipment and submit related evidence to Engineer to support such data.

SC-11.03 *Unit Price Work*

SC-11.03.D. Delete Paragraph 11.03.D in its entirety and insert the following in its place:

- D. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment under the following conditions:
 1. if the Bid price of a particular item of Unit Price Work amounts to 10 percent or more of the Contract Price and the variation in the quantity of that particular item

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of Unit Price Work performed by Contractor differs by more than 100 percent from the estimated quantity of such item indicated in the Agreement; and

2. if there is no corresponding adjustment with respect to any other item of Work; and
3. if Contractor believes that Contractor has incurred additional expense as a result thereof; or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.
4. Adjusted unit prices, if any, shall be applied as follows:
 - a. Quantity Overruns: Applied only to the difference between the total quantity of completed Work and the calculated quantity of Work at the variation limit for a particular item of Unit Price Work.
 - b. Quantity Underruns: The difference between the adjusted unit price and the original unit price (stated in the Agreement) shall be applied to the total quantity of completed Work for a particular item of Unit Price Work.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

SC-12.01 *Change of Contract Price*

SC-12.01.C *Contractor's Fee*. Delete the semicolon at the end of Subparagraph 12.01.C.2.c, and add the following language:

, provided, however, that on any subcontracted work the total maximum fee to be paid by Owner under this subparagraph shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

(No Amendments to General Conditions.)

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.01 *Schedule of Values*

SC-14.01.A. Replace the phrase "form of Application for Payment acceptable to Engineer" in the first sentence with the phrase "form of Application for Payment furnished by Engineer."

SC-14.02.A. Add the following to the end of Subparagraph 14.02.A.1 of the General Conditions:

By signing the Application and Certificate for Payment, Contractor certifies that all items, units, quantities, and prices of Work and material in the estimate are correct, that all claimed Work has been performed and materials supplied in full accordance with the Contract, and that Contractor

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has no claims for damages, losses or expense against Owner for compensation in addition to that provided for in the application except such claims for change of Contract Price as Contractor has filed with Engineer and Owner in writing (in accordance with Article 10) prior to the date of his certifying the application.

SC-14.02.B. Add the following subparagraph after subparagraph 14.02.B.5.d of the General Conditions:

- e. or because of Contractor's failure to submit certifications, affidavits, schedules, or other written information when and as required in the Contract Documents, or Contractor's failure to make submittals in accordance with the Schedule of Submittals.

SC-14.02.C. *Payment Becomes Due*

SC-14.02.C.1. In Subparagraph 14.02.C.1, replace "Ten days," with "30 days."

SC-14.07 *Final Payment*

SC-14.07.A. Add the following subparagraph immediately after Paragraph 14.07.A.3:

4. The application shall be made on forms provided by Engineer. By signing the application and certificate for payment, Contractor certifies that the total cost of the Work and the amount due Contractor for payment is full compensation for all Work done under the terms of the Contract in its original form; that the payment is full compensation for all Work ordered to be done under Change Orders; and that the payment is full compensation for all other Work done by Contractor and for all damages, losses, and expense incurred by Contractor for doing and furnishing everything relating to or arising out of the Work, and that Contractor waives all right to claim or receive any further compensation in addition to that provided for in the final payment except as provided in paragraph 14.09.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

(No Amendments to General Conditions.)

ARTICLE 16 - DISPUTE RESOLUTION

SC-16.01 *Methods and Procedures*

SC-16.01 Delete Paragraph 16.01.C in its entirety and insert the following in its place:

- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 1. elects in writing to demand arbitration of the Claim, pursuant to Paragraph SC-16.02; or
 2. agrees with the other party to submit the Claim to another dispute resolution process.

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ARTICLE 17 - MISCELLANEOUS

Add the following new paragraphs immediately after Paragraph 17.06:

SC-17.07 *Labor and Legal Requirements*

- A. Contractor shall abide by all regulations and laws that relate to labor that may affect the Work of this Contract, including Federal, State, County, and Town regulations.
- B. The latest Prevailing Wage Rate Schedules setting forth minimum wages and supplements for this area of the state, together with labor standard provisions and non-discrimination in employment provisions are appended to the Agreement.
- C. The Contractor shall make provision for the disability benefits, unemployment insurance and social security required by law.
- D. The Contractor shall keep himself fully informed of all laws of the State (in which the Project is located) and of the United States of America, and of all municipal laws and ordinances in any manner affecting the Work of this Contract, and of all orders or decrees of any body or tribunal having any jurisdiction or authority in any manner affecting such Work, and shall be responsible for strict compliance therewith. If any clause of this Contract does not conform to any such law, such clause shall be void insofar as it conflicts with such law, and such law shall be operative in lieu thereof.
- E. Each and every provision of law and clause required by law to be inserted in this Contract should be, is and is deemed to be inserted herein, and if through a mistake or otherwise any such provision is not inserted, or it is not correctly inserted, then upon the application of either party the Contract shall forthwith be amended physically to make such insertion.
- F. If any provision herein shall be as to destroy the mutuality of this Contract or to render it invalid or illegal, then if such provision shall not appear to have been so material that without it the Contract would not have been made by the parties, it shall not be deemed to form part thereof but the balance of the Contract shall remain in full force and effect.

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SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Work covered by Contract Documents.
- B. Contractor's use of site.
- C. Limits of work area.
- D. Sequence of work.
- E. Connections to existing facilities.
- F. Alteration project procedures.
- G. Cutting and patching.
- H. Facility outages.
- I. Continuity of service plan.
- J. Requests to work outside normal working hours.

1.02. PROJECT – WORK COVERED BY CONTRACT DOCUMENTS

- A. Work covered by the Contract Documents is described in the Agreement. The work to be performed under the contract generally includes, but is not limited to:
 - 1. Construction of an addition to the existing North Broadway Booster Pump Station.
 - 2. Installation of a UV disinfection system.
 - 3. Relocation of the chlorine feed system.
 - 4. Installation and programming of a new pump control panel.
 - 5. Removal and replacement of the emergency generator.
 - 6. Replacement of the electrical service and relocation of the gas service for the pump station.
 - 7. Site rehabilitation and other miscellaneous site work.

1.03. ADMINISTRATIVE AND PROCEDURAL SECTIONS APPLICABLE TO ALL CONTRACTS

- A. Section 01019 – Contract Considerations
- B. Section 01039 – Coordination

- C. Section 01300 - Submittals
- D. Section 01380 – Construction Documentation
- E. Section 01400 – Quality Control
- F. Section 01600 – Materials and Equipment
- G. Section 01640 – Equipment-General
- H. Section 01660 – Testing and Startup
- I. Section 01700 – Record Documents

1.04. TEMPORARY FACILITIES AND SERVICES SECTIONS APPLICABLE TO ALL CONTRACTS

- A. Section 01500 – Temporary Facilities
- B. Section 01564 – Erosion Control

1.05. CONTRACT NO. 1 - GENERAL CONSTRUCTION

- A. Provide administrative and procedural work under the sections listed above.
- B. Provide temporary facilities and services under the sections listed above.
- C. Provide those construction facilities and temporary controls identified in Section 01500 which are required to be provided by the Contractor.
- D. Prepare, coordinate and revise Master Construction Progress Schedule as required under Section 01310.
- E. Provide construction documentation of project as required under Section 01380.
- F. Conduct testing of project components as required under Section 01660.
- G. Perform Work identified in Bid Item Description pages for this contract under Sections 01025 and 01026.
- H. Work of this Contract not specifically identified in the Bid Item Descriptions, but nevertheless required in the Contract Documents, shall be performed as shown and/or specified.

1.06. CONTRACTOR USE OF SITE

- A. Limit use of site to allow Owner occupancy and partial utilization.

1.07. LIMITS OF WORK AREA

- A. Confine construction operations within the Contract Limits shown on the Drawings.
- B. 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.

1.08. OWNER OCCUPANCY

- A. The existing pump station will remain in operation for the entire duration of construction. Owner will make daily visits to the existing pump station 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.

1.09. SEQUENCE OF WORK

A. General

- 1. The Town of North Castle, NY is under an Administrative Order on Consent to construct and place into service a new UV disinfection system. Contractor is hereby notified that the following milestone dates are a component of the Order on Consent and are not subject to negotiation or modification. The Town of North Castle, NY is subject to fines related to the failure to achieve the following milestones. The fines are described in the Agreement.
 - a. January 8, 2016 – Issue Notice to Proceed to Contractor.
 - b. September 30, 2016 – Complete construction and commence operation of the UV disinfection system.
 - c. October 1, 2016 – UV disinfection system shall be online and all water pumped by the North Broadway Booster Pump Station shall be treated by the UV disinfection system in compliance with federal regulations.
- 2. Provide an intended sequence of construction in accordance with Section 01310, Progress Schedule.
- 3. Contractor shall be solely responsible for the means, manpower, methods, techniques, sequences and procedures of construction unless specifically identified in the Contract Documents.
- 4. Contractor shall be responsible for sequencing and coordinating the work in accordance with the Contract Documents.
- 5. Contractor shall provide temporary facilities to maintain continuous operation of all existing facilities and utilities unless scheduled facility shutdowns are identified in the Contract Documents
- 6. Work shall be performed in a manner that minimizes impact to normal operation of existing facilities and utilities.
- 7. Contractor's operations shall not cause Owner to violate operating permit requirements.
- 8. If Contractor's operations cause Owner to receive a notice of violation for a drinking water violation or erosion and sedimentation practices, all costs including fines, legal notices, mailings, administrative tasks, and engineering associated with resolving the notice shall be borne by Contractor.

B. Sequence Constraints

1. No buried plastic piping connections to new structures shall be allowed until a minimum of 45 days following completion of major structural and masonry components to allow initial settling to occur.
2. The 6-inch diameter temporary piping bypass around the UV disinfection system, shown on the Drawings, shall not be removed until all of the following have occurred:
 - a. The new water piping and valves and UV reactors have been pressure tested and disinfected in accordance with the Contract Documents.
 - b. The UV reactors have been started up and tested in accordance with the Contract Documents.
 - c. The new UV disinfection system is acceptable to the Engineer.
3. No unscheduled shutdowns of the pump station are permitted.
4. To facilitate the compliance with the above Order on Consent dates, the following milestone dates are included and shall be achieved by the Contractor.
 - a. Within 20 days from Notice to Proceed, submit all shop drawings for Section 11390, Ultraviolet Disinfection Equipment.

1.10. 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.

1.11. CONNECTIONS TO EXISTING FACILITIES

- A. Contractor shall provide all cutting and patching required for connection to existing facilities.
- B. Temporary connections to existing facilities are covered in Section 01500, Temporary Facilities.
- C. Contractor shall provide all openings, chases, etc., to fit its own work. 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 the 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 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 the Contractor.

- E. After installation of the pipe, conduit or duct is completed, the Contractor shall be responsible for sealing the annular space around the installed pipe, conduit or duct in accordance with laws and regulations.
- F. 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.
- G. 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.
- H. Temporary connections to existing facilities are covered in Section 01500, Temporary Facilities.

1.12. ALTERATION PROJECT PROCEDURES

- A. Materials - As specified in individual specification 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 original 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. Patched work to match existing adjacent work in texture and appearance.
- F. 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.
- G. Where a change of plane of 1/4-inch or more occurs, submit recommendation for providing a smooth transition for Engineer review.
- H. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- I. Finish surfaces as specified in individual specification sections.

1.13. CUTTING AND PATCHING

- A. Employ a 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.
- 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 with new products in accordance with requirements of Contract Documents.
- G. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- 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 Engineer in writing for decision or remedy.

1.14. FACILITY OUTAGES

- A. Provide a minimum of 10 working days' written notice to Owner and Engineer prior to actual date of scheduled outage.
- B. The pump station may shut down a maximum of eight hours during the hours of 10:00 p.m. to 6:00 a.m. The pump station may shut down a maximum of six hours during the hours of 6:00 a.m. to 10:00 p.m. A minimum of two days of normal operation must be provided in between extended shutdowns of the pump station.
- C. The pumps can be shut down for a one-hour period on any day (Monday through Thursday) upon prior coordination and approval by Owner.

- D. A single pump may be taken offline for a maximum of four days (Monday through Thursday), as long as the second pump remains online. In the event the online pump should fail, Contractor shall return the offline pump to service within one hour.
- E. Contractor shall provide provisions for bypass pumping at no additional cost to Owner if the work cannot be completed in an eight-hour period, to maintain pump station operation.
- F. The pump station shall be provided with a backup power supply capable of operating both pumps and all equipment within the pump station for the entire duration of the project. Contractor is responsible for providing a temporary emergency generator to power the pump station, as needed, during the relocation of the gas service, demolition of the existing generator, installation of the new generator, and any other work that interrupts the supply of backup power to the pump station beyond the shutdown limits specified herein.
- G. 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.
- H. Have all required materials, labor, tools, and equipment on site at the required locations and available for use prior to beginning an outage.
- I. Provide all temporary facilities required for outages in accordance with Section 01500, Temporary Facilities.
- J. Outages cannot be scheduled to begin on a Friday or day before a scheduled holiday.
- K. Begin work on temporarily isolated facilities immediately after isolation and expedite.
- L. 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.
- M. The Owner will be responsible for operating valves and equipment necessary to take existing facilities offline. The Contractor shall be responsible for draining water from piping and other water holding structures as required for new work. Contractor is responsible for final washdown and cleaning of existing facilities to the degree required to perform associated work.

1.15. 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.

1.16. REQUESTS TO WORK OUTSIDE OF NORMAL WORKING HOURS

- A. Submit requests to work outside normal working hours at least two weeks 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

Contractor's Application for Payment No.		
	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

**Application For Payment
Change Order Summary**

Approved Change Orders			1. ORIGINAL CONTRACT PRICE \$
Number	Additions	Deductions	2. Net change by Change Orders \$
			3. Current Contract Price (Line 1 ± 2) \$
			4. TOTAL COMPLETED AND STORED TO DATE
			(Column F on Progress Estimate)..... \$
			5. RETAINAGE:
			a. X Work Completed..... \$
			b. X Stored Material..... \$
			c. Total Retainage (Line 5a + Line 5b)..... \$
			6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c) \$
			7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application) \$
			8. AMOUNT DUE THIS APPLICATION \$
			9. BALANCE TO FINISH, PLUS RETAINAGE
			(Column G on Progress Estimate + Line 5 above)..... \$
TOTALS			
NET CHANGE BY			
CHANGE ORDERS			

Contractor's Certification	
The undersigned Contractor certifies that to the best of its knowledge: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.	
By:	Date:

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ (Engineer) _____ (Date)

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ (Owner) _____ (Date)

Approved by: _____ (Funding Agency (if applicable)) _____ (Date)

Endorsed by the Construction Specifications Institute.

Certificate of Substantial Completion

Project:	
Owner:	Owner's Contract No.:
Contract:	Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- ☐ All Work under the Contract Documents: ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- ☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date

Accepted by Contractor	Date

Accepted by Owner	Date

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

- ☐ Nonagreement on pricing of proposed change.
- ☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price \$ _____ (increase/decrease) Contract Time _____ (increase/decrease)
days

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Received for Contractor by:	Date
Received by Funding Agency (if applicable):	Date:

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):

CHANGE IN CONTRACT PRICE:

Original Contract Price:

\$ _____

[Increase] [Decrease] from previously approved
Change Orders No. _____ to No. _____:

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change Order:

\$ _____

CHANGE IN CONTRACT TIMES:

Original Contract Times: ☐ Working days ☐ Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders
No. _____ to No. _____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____
Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

ACCEPTED:

By: _____
Owner (Authorized Signature)

Date: _____

ACCEPTED:

By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____

Change Order

Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Owner or Contractor for approval, depending on whether the Change Order is a true order to the Contractor or the formalization of a negotiated agreement for a previously performed change. After approval by one contracting party, all copies should be sent to the other party for approval. Engineer should make distribution of executed copies after approval by both parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

Field Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Attention:
You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____
(Specification Section(s)) (Drawing(s) / Detail(s))

Description:

Attachments:

Engineer:

Receipt Acknowledged by Contractor:	Date:

Copy to Owner

SECTION 01019

CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01. SECTION INCLUDES

- 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. CASH ALLOWANCES

- A. Engineer Responsibilities
 - 1. Consult with Contractor for consideration and selection of products.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
- B. Contractor Responsibilities
 - 1. Assist Owner and/or Engineer in selection of products.
 - 2. Obtain proposals from Suppliers and offer recommendations.
 - 3. On notification of selection by Engineer, execute purchase agreement with designated Supplier.
 - 4. Arrange for and process Shop Drawings and Samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Notify Engineer immediately of missing components, damage, defects, and/or any other items relating to delivery that could impact Contractor's obligations.
 - 6. Submit receipts and documentation substantiating costs with Application for Payment.

C. Cash Allowances Schedule

1. General Contingency Allowance – Include the stipulated sum of \$50,000 for miscellaneous additional work as authorized by the Engineer and Owner.
2. Laboratory Equipment Allowance – Include the stipulated sum of \$10,000 for purchase of laboratory equipment as authorized by the Engineer and Owner.
3. SCADA Software Allowance - Include the stipulated sum of \$13,000 for the purchase and delivery of software for the SCADA system in accordance with Section 17561, Industrial PC (IPC).

1.04. SCHEDULE OF VALUES

- A. Submit three hard copies of Schedule of Values in accordance with the time frames identified in General and Supplementary Conditions.
- B. Line items shall be subdivided into the Bid Items shown on the Bid Form.
- C. The sum of all line items in the Schedule of Values shall equal the Total Bid Price included on the Bid Form.
- D. Each line item shall include a directly proportional amount of the Contractor's overhead and profit.
- E. Schedule of Values shall serve as a breakdown of Work used to establish progress payments. Progress payments for lump sum items will be made based on the percentages of completion of the work items included in the Schedule of Values for each lump sum item. Progress payments for Unit Price Work will be based on actual quantities of work performed. Progress payments for Contingent Unit Price work will only be made if work is authorized by Owner and/Engineer. Progress payments for Allowances will be made as described elsewhere in the Contract Documents.
- F. For Lump Sum Bid Items, the following Format shall be followed when developing the Schedule of Values.
 1. If Mobilization is not identified in the Bid Form as a separate Bid Item, Contractor may include in the Schedule of Values a line item for Mobilization as part of a Lump Sum Bid Item.
 - a. Lump sum line item shall include all work described in the definition of mobilization included herein.
 - b. Costs for bonds and insurance shall be included in the lump sum mobilization line item.
 - c. When Contractor has made utility connections, installed Contractor's field offices, Owner's and/or Engineer's field offices, and all other facilities required to begin work on a substantial portion of the Project, a payment of 50 percent of the lump sum mobilization Bid item will be made provided Contractor has already satisfied the requirements of General Condition Article GC-2.07. The remaining 50 percent will be prorated over the next five monthly progress payments.
 - d. Mobilization cost shall not be greater than 5 percent of the Total Bid Price.

2. Included separate line items for demobilization, record documents, and contract closeout.
3. Site work shall be subdivided into itemized quantities and unit costs for all individual construction components. Items shall be separated according to specification section titles listed in the Table of Contents.
 - a. Site work shall not include earthwork (such as excavation) or structural work (such as foundations) specific to a particular structure or process.
 - b. Include a separate item for erosion and sediment control under sitework.
 - c. Include off-site hauling of fill material under site work.
 - d. Include paving under site work.
 - e. Include site restoration.
 - f. Include yard piping and ductbanks.
4. Each major construction component such as a structure or building (i.e. pumping station, filter, control building, etc.) shall have its own subsection and shall be subdivided into line items for individual construction components itemized by unit costs and quantities. Include earthwork or foundations specific to the major construction component with that construction component (i.e. excavation for a pumping station). Items shall be separated according to specification section titles listed in the Table of Contents. Contractor may provide further divisions within each specification section if desired or needed for clarity.
 - a. For all mechanical equipment, each item shall be separated into the following four distinct payment items:
 - 1) Furnish equipment.
 - 2) Install equipment.
 - 3) Startup and testing.
 - 4) Training.
5. Electrical, instrumentation, and controls should be listed under the major construction component (structure or building) in which it is installed. Major electrical components not located in a specific structure or building, such as substations or emergency generators, may have their own line items under the category of "Major Power Distribution".
6. Revise Schedule of Values to include executed Change Orders with each Application for Payment. List each Proposed Change Order (PCO) that is incorporated into executed Change Orders.

1.05. APPLICATIONS FOR PAYMENT

- A. Submit three original signature versions of each application on forms furnished by Engineer.

- B. Contractor must have all record documents as identified in General Conditions Article 6.12 current and up to date prior to submitting Applications for Payment.

1.06. CHANGE PROCEDURES

- A. Supplementing the General Conditions and Supplementary Conditions, 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, if applicable, within 10 days.
- B. 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.
- C. Execution of Change Orders - Engineer will issue Change Orders for signatures of parties in the following order: Engineer, Contractor, Owner.

1.07. ALTERNATES

- A. Bid alternates identified on the Bid Form will be reviewed and accepted or rejected at the Owner's discretion prior to execution of the Agreement. Accepted Additive and Deductive Alternates will be identified in the Agreement. Accepted Additive Alternates will be included in the Work and accepted deductive alternatives will not be included in the Work.

1.08. STANDARD FORMS

- A. Use standard forms attached to this section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01025

UNIT PRICE 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 unit price items.
- D. Bid Item Descriptions - Attached pages.

1.02. PRICE MAKE-UP

- A. Unit 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 unit price 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 Specification section(s) covering each component.
- D. Cross-references to associated work not included in the item.
- E. Criteria to be applied in measuring number of completed units, for payment purposes.
- F. Limitations, if any, imposed on the measurement of completed units, for payment purposes.

1.04. LIST OF UNIT PRICE ITEMS - CONTRACT NO. 1

Bid Item Description Number	Bid Item Title
B-1	Excavation Below Subgrade
B-2	Special Backfill Material
B-3	Additional Exploratory Excavations
B-4	Rock Removal

1.05. BID ITEM DESCRIPTIONS

- A. Bid Item Description pages are attached at the end of this specification section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

EXCAVATION BELOW SUBGRADE

- A. DESCRIPTION Under this Item, the Contractor shall, if ordered by the Engineer as a result of moderately unstable or unstable foundation conditions, excavate below the bottom of the subgrade required on the Contract Drawings. Excavation shall be to the widths and depths ordered by the Engineer.
- B. WORK INCLUDED UNDER THIS ITEM Excavating (Section 02222)
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM Special Backfill Material (Bid Item B-2)
Rock Removal (Bid Item B-4)
Excavation for Work Shown on the Contract Drawings (Bid Item A-1)
Work included Under All Other Bid Items
- D. METHOD OF PAYMENT Payment for this item will be made on a unit price per bank cubic yard basis.
- E. MEASUREMENT AND LIMITS The quantity for which payment will be made shall be the total bank cubic yards of material removed as ordered by the Engineer, as measured (depth, length, and width) by Engineer. Contractor will not be entitled to payment for over-excavation beyond the limits ordered by the Engineer.

SPECIAL BACKFILL MATERIAL

- A. DESCRIPTION Under this item, if directed by Engineer, furnish, place, and compact additional NYSDOT 733-0404 subbase course, Type 4 backfill material as directed by the Engineer.
- B. WORK INCLUDED UNDER THIS ITEM Backfill (Section 02223)
Compaction (Section (02228)
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM Excavation Below Subgrade (Bid Item B-1)
Backfill for Work Shown on the Contract Drawings (Bid Item A-1)
Work included under all other Bid Items
- D. METHOD OF PAYMENT Payment for this item will be made on a unit price per loose cubic yard basis.
- E. MEASUREMENT AND LIMITS The quantity for which payment will be made shall be the total cubic yards of material furnished, placed, and compacted, as measured (depth, length, and width in its compacted condition) by Engineer, in place within the limits shown on the Drawings.

ADDITIONAL EXPLORATORY EXCAVATIONS

- A. DESCRIPTION Under this Item, the Contractor shall, if ordered by the Engineer, perform exploratory excavations to determine the location of existing utilities and underground structures. Excavations shall be backfilled with NYSDOT 733-0404 subbase course, Type 4 material.
- B. WORK INCLUDED UNDER THIS ITEM Excavating (Section 02222)
Backfilling (Section 02223)
Compaction (Section 02228), Compact in accordance with Table 1, Element I.a for "Fill beneath foundation elements and under slabs-on-grade"
Erosion Control (Section 01564)
Protection of Existing Facilities (Section 02205)
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM Work Included Under All Other Bid Items
- D. METHOD OF PAYMENT Payment for this item will be made on a unit price per bank cubic yard basis.
- E. MEASUREMENT AND LIMITS The quantity for which payment will be made shall be the total bank cubic yards of material removed as ordered by the Engineer, as measured (depth, length, and width) by Engineer.

UNIT PRICE ITEM

BID ITEM B-4ROCK REMOVAL

- A. DESCRIPTION Under this Item, the Contractor shall furnish all labor, materials, and equipment to remove rock by mechanical methods, if encountered, to the widths and depths indicated below or shown on the Drawings, or to the widths and depths ordered by the Engineer. Rock shall be as defined in Section 02226.
- B. WORK INCLUDED UNDER THIS ITEM Rock Removal (Section 02226)
Furnish and Place Additional Select Material or Mix C Concrete (Due To Over-Excavation by Contractor) to Provide a Proper Support for Pipe or Structure Foundations (Section 02228)
Protection of Existing Facilities (Section 02205)
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM Normal Excavation for Pipes and Structures (Applicable Bid Items)
Work Included Under All Other Bid Items
- D. METHOD OF PAYMENT Payment for this item will be made on a unit price per cubic yard basis.
- E. MEASUREMENT AND LIMITS The quantity for which payment will be made shall be the total cubic yards of rock excavated and disposed of, as measured (depth, length, and width) in its undisturbed state within the limits shown or specified. Maximum payment limit shall be 12 inches outside of pipe O.D., manhole box, headwall, or structure footing; 6 inches below pipe invert; and 12 inches below structure base. All measurements shall be performed by Engineer.

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 Descriptions - Attached pages.

1.02. RELATED SECTIONS

- A. Section 01010 – SUMMARY OF WORK: Identification of Work common to all separate contracts.

1.03. 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.

1.04. 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-references to associated work not included in the item.

1.05. LIST OF LUMP SUM ITEMS - CONTRACT NO. 1

Bid Item Description Number	Bid Item Title
A-1	General Construction
A-2	Construction Documentation
A-3	Record Documents

1.06. BID ITEM DESCRIPTIONS

- A. Bid Item Description pages are attached at the end of this specification section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

LUMP SUM ITEM

BID ITEM A-1GENERAL CONSTRUCTIONA. DESCRIPTION

Under this item, the General Contractor shall furnish all materials, labor, tools, and construct the general construction work as called for in the Contract Documents and as outlined below.

B. WORK INCLUDED
UNDER THIS ITEM

Mobilization
Demobilization
Insurance and Bonds (General and Supplementary Conditions)
Summary of Work (Section 01010)
Contract Considerations (Section 01019)
Coordination (Section 01039)
Submittals (Section 01300)
Progress Schedules (Section 01310)
Quality Control (Section 01400)
Temporary Facilities (Section 01500)
Erosion Control (Section 01564)
Materials and Equipment (Section 01600)
Equipment-General (Section 01640)
Testing and Startup (Section 01660)
Record Documents (Section 01700)
Demolition (Section 02030)
Pavement Cutting (Section 02112)
Protection of Existing Facilities (Section 02205)
Excavating (Section 02222)
Backfilling (Section 02223)
Compaction (Section 02228)
Aggregate Base Course (Section 02231)
Asphalt Concrete Paving (Section 02510)
Concrete Curbs (Section 02524)
Disinfection of Water Distribution Systems (Section 02675)
Site Restoration (Section 02980)
Concrete Formwork (Section 03100)
Concrete Reinforcement (Section 03200)
Concrete Joints (Section 03251)
Concrete Anchors (Section 03252)
Cast-In-Place Concrete (Section 03300)
Grout (Section 03600)
Mortar (Section 04100)
Masonry Accessories (Section 04150)
Unit Masonry Construction (Section 04201)
Concrete Unit Masonry (Section 04220)
Miscellaneous Fabrications (Section 05500)
Rough Carpentry (Section 06100)
Fabricated Wood Trusses (Section 06191)
Bituminous Dampproofing (Section 07160)
Building Insulation (Section 07210)
Asphalt Shingles (Section 07311)

A-1 (continued)

B. WORK INCLUDED
UNDER THIS ITEM
(continued)

Flashing and Trim (Section 07620)
Gutters and Downspouts (Section 07631)
Elastic Masonry Flashing (Section 07650)
Caulking and Sealants (Section 07920)
Hollow Metal Doors and Frames (Section 08115)
Fixed Window System (Section 08520)
Finish Hardware (Section 08710)
Gypsum Wallboard (Section 09250)
Painting (Section 09900), including all pipe labels
Signs (Section 10441)
Pumping Equipment – General (Section 11300), gauges
Liquid Chemical Feed Systems (Section 11348)
Ultraviolet Disinfection System (Section 11390)
Inside Process Piping (Section 15060)
Inside Process Valves and Hydrants (Section 15100)
Supports and Anchors (Section 15140)
Motors (Section 15170)
Plumbing – General (Section 15400)
Plumbing – Supply Piping (Section 15410)
Plumbing – Drainage and Vent Piping (Section 15430)
Plumbing – Fixtures (Section 15440)
Terminal Heat Transfer Units (Section 15835)
Power Ventilators (Section 15870)
Ductwork Accessories (Section 15910)
Air Outlets and Inlets (Section 15940)
Electrical Work (Section 16055)
Control Panels and Enclosures (Section 16161)
Utility Service Entrance (Section 16421)
Transformers (Section 16460)
Contactors and Motor Starting Equipment (Section 16484)
Transfer Switches (Section 16497)
Packaged Engine Generator Systems (Section 16620)
Auxiliary Controls and Relays (Section 16900)
Instrumentation (Section 17000)
Programmable Logic Controllers (PLC) (Section 17100)
Flow Meters (Magnetic Type) (Section 17400)
Industrial PC (IPC) (Section 17561)
Chlorine Residual Analyzers (Section 17601)
Contract Drawings

C. ASSOCIATED WORK
NOT INCLUDED
UNDER THIS ITEM

All Other Bid Items

D. METHOD OF PAYMENT

Payment will be made on a lump sum basis in accordance with the Contractor's approved Schedule of Values which shall include, as a minimum, all items listed herein under "B" broken down into sufficient detail for Engineer to adequately review progress payment amounts.

CONSTRUCTION DOCUMENTATION

- A. DESCRIPTION Under this item, Contractor shall provide construction photography in accordance with the Contract Documents.
- B. WORK INCLUDED UNDER THIS ITEM Construction Photographs (Section 01380)
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM Record Documents (Section 01700), Bid Item A-3
All Other Bid Items
- D. METHOD OF PAYMENT Payment will be made on a lump sum basis. Following submission of acceptable pre-construction photography, Contractor will be paid 25 percent of the scheduled value for this Bid Item. The remaining 75 percent will be paid with the final Application for payment upon submission of acceptable final construction photos. This Item has a minimum stipulated price; see Bid Form.

LUMP SUM ITEM

BID ITEM A-3RECORD DOCUMENTS

- A. DESCRIPTION Under this item, General Contractor shall provide record drawings in accordance with the Contract Documents.
- B. WORK INCLUDED UNDER THIS ITEM Record Documents (Section 01700)
Record Documentation Requirements Specific to Electrical Work (Section 16055)
- C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM Construction Photography (Section 01380)
All Other Bid Items
- D. METHOD OF PAYMENT Payment will be made on a lump sum basis in accordance with the Contractor's Schedule of Values which shall include, as a minimum, all items listed herein under "B". This Item has a minimum stipulated price; see Bid Form.

SECTION 01039

COORDINATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Coordination.
- B. Field engineering.
- C. Preconstruction conference.
- D. Progress meetings.

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 a public right-of-way.
- B. Coordinate scheduling, submittals, and work of the various specification sections 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 clean up of work of separate sections in preparation for Substantial Completion and for portions of work designated for Owner's partial utilization.
- G. After Owner use of facilities, 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. 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.
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.

1.04. PRECONSTRUCTION CONFERENCE

- A. Engineer will schedule a conference after the Effective Date of Agreement.
- B. Attendance Required: Owner, Engineer, funding agency, and Contractor.
- C. Agenda
 1. Distribution of extra sets of Contract Documents.
 2. Submission of list of Subcontractors, list of products, Schedule of Submittals, Schedule of Values, and Progress Schedule.
 3. Designation of personnel representing the parties in Contract and Engineer.
 4. Procedures and processing of field decisions, submittals, substitutions, Applications for Payments, proposal requests, 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 Owner; and by Contractor.
 10. Procedures for testing.
 11. Procedures for maintaining record documents.
 12. Maintenance of vehicular traffic detours, flagmen, etc.
 13. Periodic cleanup of site.
 14. Notification of utilities' owners.
 15. Electronic communications.
- D. Engineer will record minutes and distribute copies to participants.

1.05. 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 14 days to participants, and those affected by decisions made.
- C. Attendance Required - Owner, Engineer, job superintendent, 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.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

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. Shop drawings.
- E. Samples.
- F. Manufacturer's instructions.

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.
 - 5. For example:
 - a. 15073-01-01 – Field lock gaskets for DIP (first review cycle)
 - b. 15073-01-02 - Field lock gaskets for DIP (second review cycle)
 - c. 15073-02-01 – Flange pipe and fittings (first review cycle)
 - d. 15073-02-02 – Flange pipe and fittings (second review cycle)
 - e. 15073-02-03 – Flange pipe and fittings (third review cycle)
- C. Identify Project, Contractor, Subcontractor, and Supplier; pertinent Drawing number and detail number(s), and Specification sections, as appropriate.
- D. Apply stamp, signed or initialed providing certification required by General Condition Article 6.17.C.2. At a minimum, stamp shall include the following information:
 - 1. Submittal Number _____
 - 2. Deviations: None _____; As Listed _____

3. Reference Specification Section _____
4. Reference Drawing Number _____
5. Space Requirement: As Designed _____ Different, As Listed _____
6. Representation is made to Owner and Engineer that Contractor has satisfied the requirements of General Conditions Article 6.17.C.1.a through d, [associated Supplementary Conditions], and that the Contractor hereby approves this submittal.
Contractor _____
Signature _____
Date _____
Date _____

- E. Schedule submittals to expedite the Project, and deliver to Engineer's business address.
- F. Before submitting each shop drawing or sample, Contractor shall have performed the duties outlined in General Conditions Article 6.17.C.
- G. Identify deviations from Contract Documents in accordance with General Conditions Article 6.17.C.3.
- H. Identify product and/or system limitations which may be detrimental to successful performance of the completed Work.
- I. Identify space requirements which differ from those designed and/or shown on the Contract Documents.
- J. Provide space for Contractor and Engineer review stamps.
- K. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- L. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.
- M. Revise and resubmit in accordance with General Conditions Article 6.17.E. Identify all changes made since previous submittal in a cover letter or memorandum.
- N. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- O. Submittals not required will not be recognized or processed.
- P. Items shall not be fabricated or delivered without fully approved Shop Drawings.
- Q. Ensure no associated work begins until associated Shop Drawings are fully approved.
- R. Fabrication prior to receiving an "Approved" or "Approved as Corrected – No Resubmittal Required" is at Contractor's risk.

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 14 days shall be allowed for Engineer's review of submittals and resubmittals unless otherwise specified in the Contract Documents.
2. No less than 21 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 – Resubmit Written Responses and Requested Information
4. Revise and Resubmit
5. Not Approved
6. 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 three copies of preliminary Schedule of Submittals in accordance with General Conditions Article 2.05.
- B. Revise and resubmit until acceptable to Engineer.

1.05. SHOP DRAWINGS

- A. Provide information in accordance with General Conditions Article 6.17 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.
- 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.
- I. Submit five opaque reproductions to Engineer, three copies of which will be retained by the Engineer.

1.06. SAMPLES

- A. Provide in accordance with General Conditions Article 6.17 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, 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.

1.07. 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 Shop Drawings.
- B. When specified in Section 01640, Equipment-General or individual equipment Sections submit manufacturer's operation and maintenance instructions for equipment supplied under this Contract in the quantities identified in Section 01640, Equipment-General.
- C. Identify conflicts between manufacturers' instructions and Contract Documents.

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 Contractor's 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 Microsoft Project.
- B. Progress Schedule shall be maintained throughout entire Contract and shall be used by 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 all anticipated shutdowns.
 - 4. 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.
 - 5. Include time required by Contract Documents based on work days lost due to inclement weather.
 - 6. 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 10 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. SUBMITTALS

A. Submit the following in accordance with the procedures identified in Section 01300, Submittals:

1. Detailed Baseline Progress Schedule:

- a. Submit one electronic version on compact disc or by email and three 22-inch x 34-inch hard copies of bar chart 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

2. Monthly Updates

- a. After acceptance of the 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 on compact disc and three 22-inch x 34-inch hard copies of bar chart.
- c. The monthly updates shall include, but not be limited to, three copies of a tabulated listing 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

- 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.

1.05. 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.

1.06. DETAILED BASELINE PROGRESS SCHEDULE

- A. Baseline Progress Schedule shall include no activity progress.
- B. 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.
- C. 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.
- D. Update to include any revisions to the System Delivery Plan identified in Section 01660, Testing and Startup.
- E. The accepted baseline Progress Schedule will form the basis of the first monthly update.

1.07. REVISIONS

- A. Engineer will be the custodian of all official versions of the Progress Schedule including 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.

1.08. 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.

1.09. 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 Time Impact Analysis 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 7 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.
- B. Construction videography.

1.02. DESCRIPTION

- A. Take construction record photographs and videography prior to mobilization and periodically during the course of the work.

1.03. CONSTRUCTION PHOTOGRAPHS

- A. Digital construction photographs shall be taken at each of the major stages on construction listed below and shall be furnished to Engineer and Owner with each Application for Payment.
 - 1. Entire project area before mobilization, including but not limited to:
 - a. All four exterior faces of the existing pump station.
 - b. Complete views of all four interior walls of the existing pump station.
 - c. Complete existing pump station ceiling.
 - d. Exposed surfaces of existing pump station floor.
 - e. Existing pumps, all sides.
 - f. Existing generator, all sides.
 - g. Existing panels on interior north wall of pump station.
 - h. Existing overhead door, interior and exterior.
 - i. Existing man door, interior and exterior.
 - 2. Completion of Underground Facilities prior to backfilling.
 - 3. Abandonment of underground utilities prior to backfilling.
 - 4. Completion of excavations for each structure.
 - 5. Completion of reinforcing and formwork prior to concrete pours.
 - 6. Completion of foundations of each structure.
 - 7. Completion of enclosure for each structure.

8. Installation of all interior and exposed exterior piping, equipment, and electrical components.
 9. Testing of all piping, equipment, and systems.
 10. Completion of Site restoration and landscaping.
- B. Views and Quantities Required
1. Two views of each item.
 2. At least five views of overall Project Site monthly.
- C. Camera used for digital photography shall be a 8.0 megapixel or greater.
- D. Electronic Copies
1. Maintain database of pictures for the entire length of the Project.
 2. Each month, provide two CDs with electronic versions of all prints taken in the past month.
 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.

1.04. CONSTRUCTION VIDEOGRAPHY

- A. Digital video shall be made to document the condition of the Site prior to mobilization.
- B. Video shall show the entire Site and shall show sufficient detail to discern existing Site conditions.
- C. Video shall identify time and date electronically on each frame.
- D. Provide two DVDs of video. Identify location, date, and time video was made.

1.05. 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 PHOTOGRAPHS

- 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 on CDs) 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.

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. 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.

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. 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. Owner shall employ and pay for the services of an independent testing laboratory to perform inspections, tests, and approvals indicated in General Conditions Article 13.03.B.
- 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 Engineer, in duplicate indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Engineer 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 Engineer and independent firm 48 hours prior to expected time for operations requiring services.
 3. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's own use.
- D. Retesting required because of non-conformance to specified requirements shall be performed, on instructions by the Engineer, 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. MANUFACTURERS' FIELD SERVICES

- A. Manufacturer field services for equipment are specified in Section 01640, Equipment—General.
- B. When additional manufacturer services are specified in other individual Specification sections, require material or product Suppliers or manufacturers to provide qualified personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing and adjusting as applicable, and to initiate instructions when necessary.
- C. Submit qualifications of observer to Engineer a minimum of 30 days in advance of required observations. Observers are subject to approval of Engineer.
- D. Report observations, Site conditions, or instructions given to applicators or installers, that are supplemental or contrary to manufacturers' written instructions.
- E. Submit report to Engineer in duplicate within 14 days of observation.

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 - Electricity, lighting, heating, ventilation, telecommunications service, water, and sanitary facilities.
- C. Temporary Controls - Barriers, enclosures and fencing, protection of the work, water control and pollution controls.
- D. Construction Facilities - Parking, maintenance of traffic, and progress cleaning.

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. Construction may require the closing of various valves to isolate equipment. The Owner does not guarantee that the 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.
- D. Provide temporary access required, including ladders, platforms, grating, walkways, and awais which comply with OSHA laws, for necessary facilities operations.
- E. 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. Provide and pay for power service required from utility source for Contractor operations and those of other contractors, including equipment, job trailers, etc.
- B. Contractor shall pay for total electric bill.
- C. Provide temporary electricity, either with a portable generator or with a new feeder from the utility. Refer to Section 01010 for additional requirements for providing backup power to the pump station for the duration of the project.
- D. Temporary Electricity Service Characteristics - As required for construction equipment and other temporary systems.

- E. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as required.
- F. Permanent convenience receptacles may not be utilized during construction.
- G. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04. TEMPORARY LIGHTING

- A. Provide and maintain lighting for Contractor operations to achieve:
 - 1. A minimum lighting level of 2 watt/sq.ft. for construction operations.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required, for Contractor's operations
- C. Maintain lighting and provide routine repairs.
- D. Permanent building lighting may be utilized during construction.

1.05. TEMPORARY HEATING

- A. Provide heat devices and heat as required to maintain specified conditions for Contractor's construction operations.
- B. Use 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.
- C. Owner will pay cost of natural gas used for heating. Exercise measures to conserve energy. Provide temporary, insulated closures of all exterior openings to minimize heating losses.
- D. Prior to operation of permanent equipment for temporary heating 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.
- E. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) in areas where construction is in progress, unless indicated otherwise in individual specification sections.

1.06. TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases for Contractor's operations.
- B. Use existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for Contractor's construction operations.

1.07. 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 direct line telephone services to Engineer for the duration of the contract as follows:
 - 1. One dedicated telephone line with call waiting.
 - 2. One dedicated fax line.
- C. Provide high-speed internet service to Engineer's field office 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 telephone equipment as follows:
 - 1. Two DECT 6.0 cordless telephones by AT&T or equal. Phones shall be two-line, pushbutton, and equipped to record and play back incoming messages using a device which can be switched into service during Engineer's absence. The answering device shall answer a call on the first ring, provide a prerecorded outgoing message, and then record the caller's incoming message.
 - 2. One conference phone by PolyCom (SoundStation2). Conference phone shall provide for full duplex simultaneous two-way conversations with business quality voice conferencing. Microphones shall be capable of 10-foot pick-up range with dynamic noise reduction.
 - 3. One plain paper facsimile/printer/copy machine by Cannon. Provide paper and toner for the duration of the contract. The machine shall have a minimum 100-sheet capacity and minimum of 10 programmable preset fax numbers.
 - 4. Contractor shall be responsible for servicing the aforementioned equipment. No components shall be out of service for more than 24 consecutive hours.

1.08. TEMPORARY WATER SERVICE

- A. Contractor may connect to Owner's existing non-potable water source at the North Broadway Booster Pump Station. Contractor shall provide backflow prevention for all connections to the Owner's water system.
- B. Owner will pay cost of water used. Exercise measures to conserve water.
- C. Contractor shall provide sufficient potable quality drinking water for workers at the project site.

1.09. TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required sanitary facilities and enclosures for use by all persons employed at the site. Provide at time of mobilization.
- B. Remove facilities from site at end of construction.

1.10. BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations. Maintain Owner access to all areas of existing pump station in operation.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
- 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.

1.11. FENCING

- A. If existing fence is removed, provide 6-foot high fence around construction Site; equip with vehicular and pedestrian gates with locks.
- B. Construction - Commercial grade chain link fence

1.12. WATER CONTROL

- A. 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.

1.13. INTERIOR ENCLOSURES

- A. Provide temporary partitions 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 reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces.

1.14. PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage and deterioration due to construction activities, traffic, birds, pests, vermin, wild-life, 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 Contractor to safeguard the existing facilities and work at no additional cost to Owner.

1.15. SECURITY

- A. Provide security and facilities to protect work, including existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.16. PARKING

- A. When site space is not adequate, provide additional off-site parking.
- B. Designate one parking space for the Owner and identify same with appropriate signs for each space.

1.17. MAINTENANCE OF TRAFFIC

- A. Maintain and regulate traffic 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. 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.
- F. 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.

1.18. PROGRESS CLEANING

- A. 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 off-site.
- B. Store unused tools and equipment at its yard or base of operations.

1.19. POLLUTION CONTROLS

- A. Dust Control
 1. Execute work by methods to minimize raising dust from construction operations.
 2. Provide positive means to prevent airborne dust from dispersing into atmosphere.
 3. 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 and the requirements of governing regulatory agencies.
 1. 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 have 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 during regular working hours
 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.

1.20. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, controls, materials, prior to Final Application for Payment.
- 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. Restore site as indicated.
- 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.

1.21. 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.

1.22. 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. One standard size desk, 3-foot x 5-foot, 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. One tackboard, 36 inches x 30 inches.
 13. One heavy-duty, metal three-hole punch.
 14. One 10-inch outdoor-type thermometer.
 15. One water cooler (provide refills as required throughout project).
 16. One refrigerator, minimum of 4.0 cubic feet, with freezer minimum of 1.0 cubic feet.
 17. One microwave oven, 0.8 cubic feet, 800 watt minimum.
 18. Heavy-duty wall shelving 20 sq. ft. minimum.
- B. Engineer's field office shall be ready for occupancy within 10 days following Notice to Proceed. Mobile field office 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. 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".

- D. Arrange for offices to be cleaned at least once every week. Restroom supplies shall be provided for the duration of the contract.
- E. Engineer's office to be erected at location approved by Engineer, and shall not be disturbed, moved or interrupted without the Engineer's approval.
- F. On completion of the contract, remove the field office from the site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

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 or silt fence.
- 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 to all erosion and sedimentation control measures of "New York State Standards and Specifications for Erosion and Sediment Control."
- D. Temporary erosion and sediment control measures shall be installed as the first step in construction and shall not be removed until permanent cover is completely established and stabilized.

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. Propex - Silt stop, Mirafi 100X or equal meeting the physical and mechanical requirements of FHA Task Force 25 specification guide for temporary silt fence.

2. Silt fence shall be constructed using fence posts and wire fence or prefabricated units in accordance with "New York State Standards and Specifications for 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 S75BN, NYP ECS-1B, 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 - Shall be installed at each work vehicle entry point.
- G. Geotextile Dewatering Bag – 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. The Drawings only show techniques such as haybale and silt fences. There are a number of control techniques discussed in this section.
 2. It is the Contractor's responsibility to design, implement and maintain erosion and sedimentation control measures which effectively prevent accelerated erosion and sedimentation.
- B. Earthmoving activities shall be conducted in such a manner as to prevent accelerated erosion and sedimentation.

- C. 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.
- D. Land disturbance shall be kept to a minimum.
 - 1. Restabilization shall be scheduled immediately after any disturbance.
- E. Silt fences or haybales shall be installed along the toe of all critical cut and fill slopes.
- F. Catch basins shall be protected with silt fences or haybales throughout the construction sequence and until all disturbed areas are stabilized.
- G. Erosion and sedimentation control measures shall be installed prior to all construction activities.
- H. 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.
- I. 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.
- J. Remove all sedimentation and erosion control barriers after completion of construction and permanent stabilization of erosion.
- K. Dewatering activities shall be completed in accordance with project plans as well as any applicable environmental permit condition.

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 stockpiles and the project area.
- B. Recommended Minimum Dimensions
 - Height - 1.5 feet
 - Top Width - 2 feet
 - Side Slopes - 2:1 or flatter
 - Material - Soil

3.03. 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. 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
 - Height - 1.5 to 2.0 feet (uniform top elevation) top
 - Width - 3 to 5 feet
 - Side Slopes - 3:1 or flatter
 - Cross-Sectional Area Required Per Tributary Acre - 20 square feet
 - Material - Coarse rock or stone
 - 3. Silt Fence
 - a. Synthetic fabric 48 inches wide for fencing material.
 - b. 2-inch by 4-inch wooden stakes at 8 to 10 feet apart for posts.
 - c. Height - $\pm$ 30 inches above ground.

3.04. GEOTEXTILE DEWATERING BAG

- A. Used for dewatering activities, geotextile dewatering bag shall be placed within a stabilized upland area.
- B. Stabilized area shall consist of a stone bedding of No. 1 stones, 6 inches deep.
- C. Dewatering bag shall be removed from site following dewatering, prior to site restoration.

3.05. 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.

3.06. 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.

3.07. 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 14 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. Planting of various permanent vegetative covers shall be performed in accordance with the site rehabilitation.
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	Air-dried; free from coarse	75 to 100 lbs., 2 to 3 bales	1.5 to 2.5 tons, 90 to 120 bales	Lightly cover 75 to 90% of surface
Wood chips	Green or air-dried	500-900 lbs.	10 to 20 tons	2 to 7 inches

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
Sundangrass	100%	1	May 15 to August 15

3.08. 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. Substitutes.

1.02. PRODUCTS

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- B. 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.
- B. Coordinate deliveries to avoid conflicts with Work, conditions at the Site, and availability of personnel and handling equipment.
- C. Transport by methods to avoid damage.
- D. Deliver in manufacturer's unopened containers or packaging, dry, with identifying labels intact and legible.
- E. Provide equipment and personnel for handling to prevent soiling and 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 in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive items in weather-tight, climate controlled enclosures in an environment favorable to item.
- B. For exterior storage of fabricated items, place on sloped supports, above ground.
- C. Provide bonded off-site storage and protection when storage and protection cannot be provided on Site.

- D. Cover items subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation.
- 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 items by methods that prevent soiling, disfigurement, and damage.
- G. Arrange storage to permit access for inspection. Periodically inspect to assure items are undamaged and are maintained in acceptable conditions.
- H. It is each Contractor's sole responsibility to maintain the stored equipment and to exercise, rotate, lubricate, or otherwise prevent damage due to storage in accordance with the manufacturer's requirements.

1.05. SUBSTITUTES

- A. Submit three copies of requests for substitution to Engineer including all items required by General Conditions Article 6.05. Each submittal shall be provided with a transmittal letter stating "REQUEST FOR SUBSTITUTION" and identifying the specific item for which the substitution is being requested.
- B. Limit each request to one proposed substitute item.

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 affidavits.
- C. Equipment design.
- D. Spare parts.
- E. Equipment identification.
- F. Shop tests.
- G. Installation of equipment.
- H. Services of manufacturer's representative.
- I. Operation and maintenance manuals.
- J. Guarantees.

1.02. SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300, Submittals.
- B. Submit performance affidavits prior to, or with 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 items listed in the Schedule of Manufacturer's Services, included at the end of this section, and as required in the individual Specifications 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 Engineer of an acceptable performance affidavit.
- D. The performance affidavit shall 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. 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 and design requirements set forth in Specification Section(s) of the Contract Documents and related Drawings."

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, shipping, handling, installation, all conditions of operation, and as required by the Contract Documents.
- C. All bearings and moving parts shall be adequately protected by bushings or other approved means against wear, and provisions shall be made for adequate lubrication by readily accessible devices.
- D. Details shall be designed for appearance as well as function. 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 Shop 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, OSHA, and local Laws and Regulations. All rotating shafts, couplings, and other moving parts of equipment shall be provided with suitable protective guards of sheet metal or wire mesh neatly and rigidly supported. Guards shall be removable 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.

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 indicating the following:
 - 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 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. SHOP TESTS

- A. Arrange shop tests of the equipment indicated in the Schedule of Manufacturer's Services and the individual Specification sections.
- B. Arrange for the Engineer to witness shop tests in the manufacturer's shop, if required by the individual Specification sections.
- C. Demonstrate equipment characteristics, including any specified pressure, duty, capacity, rating, efficiency, performance, function, and other special requirements, comply fully with the requirements of the Contract Documents and that the item will operate in the manner specified.
- D. Submit certified copies of the manufacturer's test data and interpreted results in accordance with the procedures identified in Section 01300, Submittals.

1.08. INSTALLATION OF EQUIPMENT

- A. Field modifications shall not be made without prior approval from Engineer.
- B. 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.
- C. 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.
- D. 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.
- E. Provide equipment and housekeeping pads for equipment in accordance with the Drawings.

1.09. SERVICES 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 Site on occasions after Startup 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 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 sessions shall be conducted at the Site on weekdays between the hours of 8:00 a.m. and 3:00 p.m. Actual times, locations, and durations of training sessions shall be approved by Owner.
3. Trainer shall provide all materials and training manuals required for training in quantities required by Owner.
4. 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.

1.10. 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. Operational Description – Describe operational procedures for the equipment supplied. Operational procedures shall include “startup procedures,” “normal operation,” “automated operation,” and “shutdown procedures.” Where multiple modes of automatic operation exist, describe each mode separately.
4. Preventive Maintenance - Provide a preventive maintenance table containing headings for “Daily”, “Weekly”, “Monthly”, and “Annual” (or other period as required) maintenance requirements. Under each heading, indicate visual inspections, procedural inspections, alignment and adjusting instructions, calibration routines, lubrication, and all other manufacturer suggested preventive maintenance procedures required for the equipment or system. List recommended lubricants, parts required with manufacturer part numbers, and any special tools required for the recommended maintenance. Include maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents. Where the equipment is made up of components from multiple manufacturers, the periodic maintenance requirements shall be combined into one preventive maintenance table for the system. Maintenance procedures shall include detailed instructions, check lists, diagrams, and/or photographs as applicable to assist with locating components, disassembling and reassembling the equipment for repairs or overhaul.
5. Approved Shop Drawings of each piece of equipment.
6. Manufacturer’s cut sheets and dimensional drawings of each piece of equipment, and details of all replacement parts.
7. Manufacturer’s erection, operation, and maintenance instructions for all equipment and apparatus, and complete listing of nameplate data.
8. 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.
9. Complete piping and interconnecting drawings.
10. 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.
11. Instructions with easily understood schematics or diagrams for disassembling and assembling equipment for overhaul and repair.
12. Shop testing results where applicable.
13. Manufacturer’s Installation Certificate.
14. Manufacturer’s Certificate of Equipment Compliance.
15. Field testing/performance reports where applicable.
16. Manufacturer’s equipment warranty.
17. Information not applicable to a specific piece of equipment installed on this Project shall be removed from or crossed out on the submissions.

18. 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 three or four inch, heavy-duty, three ring binders, all black covers with transparent exterior leaves for inserting cover pages. 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. Binders shall be Vernon Line Royal No. R-6372 or R-372, Sparco Brand Slanted Ring Presentation Binder 68140, Universal D-Ring View Binder 20747, K&M Division VS11-40, or equal. Pages shall be linen reinforced on the binding edge.
5. 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. All Shop Drawings shall be placed in accordion-type folders similar to File Pocket No. 74CG (9-1/2 inches by 14-3/4 inches) as manufactured by the Cooke and Cobb Company, or equal, and fully indexed on the outside of the folders in a neat and uniform manner.
6. 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.

1.11. GUARANTEES

A. 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.

B. 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.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

(continued)

SCHEDULE OF EQUIPMENT TESTING AND MANUFACTURER'S SERVICES

EQUIPMENT ITEM	SPEC. SECTION	PERFOR- MANCE AFFIDAVIT	SHOP TESTS	FIELD TESTS	CERT.	SERVICES OF MANUFACTURER'S REPRESENTATIVE			WRITTEN INSTRUC- TIONS
						INSTALLATION DAYS	TESTING AND OPERATION DAYS	TRAINING DAYS	
Ultraviolet Disinfection Equipment	11390	Yes	No	Yes	Yes	2	4	3	Yes
Electric Valve Actuators	15100	Yes	No	Yes	Yes	1	1	1	Yes
Terminal Heat Transfer Units	15835	No	No	Yes	No	--	--	--	Yes
Power Ventilators	15870	No	No	Yes	No	1/2	--	--	Yes
Automatic Transfer Switch	16497	No	No	Yes	Yes	(1)	(1)	(1)	Yes
Generator	16620	No	No	Yes	Yes	1/2	1	2-1/2	Yes
Programmable Logic Controllers (PLC)	17100	No	No	Yes	Yes	8		1/2 (2x)	Yes
Flow Meters (Magnetic Type)	17400	No	No	Yes	Yes	1/2	1/2	1/2	Yes
Chlorine Residual Analyzers	17601	No	No	Yes	No	1/2	1/2	1/2 (2x)	Yes

(1) Automatic transfer switch testing is included in generator testing and instruction.

END OF SECTION

SECTION 01660

TESTING AND STARTUP

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Definitions.
- B. Submittals.
- C. Preliminary Field Testing.
- D. Functional Testing.
- E. System Demonstration Testing.
- F. Startup.
- G. Meeting.

1.02. DEFINITIONS

- A. System - The combination of Subsystems that will collectively undergo sequential System Demonstration Testing, Startup, and delivery to the Owner. Each System includes all components necessary for that System to function as intended, including structural/architectural components, HVAC, plumbing, process equipment, piping, power, automated controls, life safety, etc.
- B. Subsystem - The multiple components of a System. Subsystems are generally defined as unit processes and support systems, including structural/architectural components, HVAC, plumbing, process equipment, piping, power, automated controls, life safety, etc
- C. Plant Process Control System (PCS) - Coordinate definition with Division 17.
- D. System Delivery Plan - Contractor's schedule for delivering Systems to the Owner.
- E. Preliminary Field Test - Field test to demonstrate that equipment is properly installed and ready for operation.
- F. Functional Test - Field test to demonstrate successful operation and performance of equipment in all intended modes of operation, including operation from remote devices with the exception of the Plant PCS.
- G. PCS Programming Phase - Period of time for PCS programmer to load, test, and debug PCS application software.
- H. System Demonstration Testing - Continuous successful operation of a System in its entirety utilizing a testing fluid prescribed by the Owner for seven consecutive days prior to Startup of that System.

- I. Startup - Continuous successful online operation of a System in its entirety utilizing actual process fluid and at actual service conditions for seven consecutive days prior to delivery of that System to the Owner.

1.03. SUBMITTALS

A. Functional Testing Plans

1. Submit at least 30 days prior to proposed Functional Testing date in accordance with procedures identified in Section 01300, Submittals.
2. Submit individual plans for each piece of equipment requiring a Functional Test.
3. Coordinate with Owner to determine testing fluid sources and include in Functional Testing Plans.

B. System Demonstration Testing and Startup Plans

1. Submit a minimum of 45 days prior to proposed System Demonstration Test date in accordance with procedures identified in Section 01300, Submittals.
2. Identify all testing media sources and disposal locations including testing fluid, sludge, utility water, chemicals, process air, instrument air, etc. for both System Demonstration Testing, and Startup.
3. Identify all instrumentation and recording devices required to complete testing.
4. Identify all required laboratory testing.
5. Identify days during which the manufacturer's representatives will be on site.

1.04. GENERAL

- A. Provide a minimum of fourteen days notice to the Owner and Engineer prior to all testing. The Owner and Engineer reserve the right to witness all testing.

B. Materials, Supplies, and Utilities

1. Owner Furnished
 - a. Raw water.
 - b. Sodium hypochlorite.
2. Contractor Furnished
 - a. All required tools, materials, and spare parts.
 - b. All required instrumentation and monitoring devices, including temporary devices required for testing (i.e., flow meters, pressure gauges, level sensors, etc.)
 - c. All required fuel, lubricants, energy, equipment, and instruments.
 - d. All required utilities not furnished by the Owner.

- e. All required chemicals not furnished by the Owner.
 - f. Laboratory services where specified or otherwise required.
 - g. Provide means to convey designated testing fluid to testing location and to disposal location unless otherwise indicated, including all temporary facilities required (i.e. pumps, piping, etc.).
- C. Connection to Existing Equipment and Facilities - Test all equipment and facilities to ensure that they are in operating condition before the final tie-ins are made which connect new equipment and facilities to existing equipment and facilities.
- D. Contractor Operating Personnel
 - 1. System Demonstration Testing - Provide the following on-call personnel that are capable of arriving at the site within two hours after request by Contractor furnished and monitored alarms:
 - a. Master Mechanic.
 - b. Master Electrician.
 - c. UV equipment representative.
 - 2. Startup
 - a. Provide Owner support as specified subsequently in this section during normal working hours.
 - b. Provide the following on call personnel that are capable of arriving at the site within two hours after request outside of normal working hours:
 - 1) Master Mechanic.
 - 2) Master Electrician.
 - 3) UV equipment representative.
- E. Tagging System
 - 1. A tagging system will be provided by the Contractor and used by Engineer to document testing and Startup progress as follows:
 - a. Yellow Tag - Preliminary Field Testing complete.
 - b. Red Tag - Functional Testing Complete.
 - c. Blue Tag - Successful completion of Startup.
 - 2. Tags will be signed and dated by Engineer upon acceptance, and shall remain attached to the item until ordered removed by Engineer.

1.05. PRELIMINARY FIELD TESTING

- A. 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.
- B. Make all changes, adjustments and replacements required to comply with the requirements of the Contract Documents.
- C. Preliminary field testing shall be witnessed by the manufacturer's representative where required by individual Specification sections.
- D. Prerequisites
1. Accepted System Delivery Plan.
 2. Permanent power has been connected and unit is ready for operation.
 3. UV Control Power Panels (CPPs) have been wired to the pump control panel and point-to-point testing has been completed.

1.06. FUNCTIONAL TESTING

- A. At a minimum, Functional Tests shall include the following:
1. Verification that equipment meets the specified performance requirements in every detail and performs its intended function without any unusual vibration, noise or other signs of possible malfunction. Unless specifically identified otherwise in individual Specification sections, all performance testing shall be conducted during Functional Testing.
 2. Motor testing where required.
 3. Vibration testing where required.
 4. Demonstration of successful operation in all control modes including from remote devices and the Plant PCS.
- B. Prerequisites
1. Accepted Functional Testing plan.
 2. Preliminary Field Testing.
 3. Manufacturer's Installation Certificate.
 4. Final Draft Operations and Maintenance Manual.
 5. Programming of the pump control panel has been completed by the Engineer.

1.07. PCS PROGRAMMING PHASE

- A. Loading, testing, and debugging PCS application software to the UV CPPs will be provided by the UV equipment manufacturer. Loading, testing, and debugging PCS application

software to the pump control panel will be provided by the Engineer. Contractor and subcontractors shall provide assistance to programmer as required by the Division 17 Specifications.

- B. PCS Programming Phase work shall be performed on a system-by-system basis.
- C. Contractor shall allocate 30 days in the Progress Schedule for the PCS Programming Phase for each defined System.
- D. The PCS Programming Phase shall not occur for a given System prior to the following:
 - 1. Engineer has witnessed and accepted PCS testing requirements specified in Division 17 for that System.
 - 2. Programmer has confirmed the PCS hardware is functioning properly, the required equipment and instrumentation is ready for operation, all necessary field wiring is complete and terminated, and Contractor has resolved all previously identified issues.

1.08. SYSTEM DEMONSTRATION TESTING

- A. Operate System in simulated fashion as described in the accepted System Demonstration Testing and Startup Plan demonstrating all modes of operation. This shall include, when practical, simulation of extreme conditions so as to check the response of instrumentation and control devices, bypass functions, pumping cycles, etc. Contractor shall be responsible for the complete operation of the System, including the positioning of valves, gates, switches, proper equipment devices, controls and associated components furnished and/or installed under this Contract. Owner will provide operation of all existing treatment plant components unless otherwise specified.
- B. If any component of the System fails to operate in accordance with the Contract Documents during System Demonstration Testing, provide all necessary repairs, maintenance, replacement of parts, corrections, adjustments, and other actions necessary to restore proper operation of the System. Required adjustments to equipment shall be made by a qualified manufacturer's representative. After the System is restored to proper operating conditions, restart the test. No credit will be given for operating time prior to System failures when calculating test durations.
- C. Equipment shall be powered from the permanent power source prior to System Demonstration Testing.
- D. Prerequisites
 - 1. Accepted System Demonstration Testing and Startup Plan.
 - 2. Functional Testing of all System components.
 - 3. Manufacturer's Certification of Equipment Compliance for all associated equipment.
 - 4. Associated System Demonstration Testing and Startup meeting.
 - 5. Required training for all System components not specifically identified in individual Specifications sections as post-startup training.
 - 6. Leakage testing of associated piping and tanks.

7. Permanent safety and protection devices installed and operational. Safety devices shall include, but not be limited to, fall protection, hand railing, grating and floor plates, leak detection, motor thermal and overload protection, emergency power generation, equipment lockouts, floatation devices, fire alarms and systems, ventilation systems, and lighting in operational areas in or directly related to the System being tested. All open excavations in or adjacent to the operational areas shall be covered.
 8. Verification that all required lubrication equipment and materials are readily available to Contractor at the Site.
 9. System piping, valves, instruments, control panels, and electrical equipment properly labeled in accordance with the Contract Documents.
 10. Control System Testing as defined in Division 17. .
 11. PCS Programming Phase.
 12. Loading of application software for systems controlled by the pump control panel.
- E. Testing fluid shall be raw water.

1.09. STARTUP

- A. Operate System under Owner's direction demonstrating all modes of operations. This shall include, when practical, simulation of extreme conditions so as to check the response of instrumentation and control devices, bypass functions, pumping cycles, etc. Contractor shall be responsible for the complete operation of the System, including the positioning of valves, gates, switches, proper equipment devices, controls and associated components furnished and/or installed under this Contract. Owner will provide operation of all existing treatment plant components and provide all required sampling and laboratory testing required for operation of System during Startup unless otherwise specified.
- B. During Startup, Owner will operate the System under actual operating conditions and test for successful operation in the various operating modes required by the Contract Documents under the direction and responsibility of the Contractor. Owner will provide all required sampling and laboratory testing required for operation of System during Startup unless otherwise noted.
 1. Provide the following support to Owner:
 - a. Routine maintenance of new equipment and devices.
 - b. Non-routine operations and maintenance, such as cleaning clogged pumps, etc.
 - c. Notify Owner prior to performing actions related to Startup or shutdown of Systems including, but not limited to, valve and gate operation, electrical shutdown, change in process flow configuration, etc.
- C. If any component of the System fails to operate in accordance with the Contract Documents during Startup, provide all necessary all repairs, maintenance, replacement of parts, corrections, adjustments, and other actions necessary to restore proper operation of the System. Required adjustments to equipment shall be made by a qualified manufacturer's representative. After the System is restored to proper operating conditions, restart the test.

No credit will be given for operating time prior to System failures when calculating test durations. Examples of System failures include, but are not limited to the following:

1. Tank overflows.
 2. Equipment failures and/or malfunctions.
 3. Instrumentation failures and/or malfunctions.
 4. Tank or piping failures and/or leakage.
 5. Loss of power to equipment and/or devices.
 6. Controls malfunctions .
- D. Upon successful completion of Startup, the System shall be delivered to the Owner for partial utilization.
- E. Prerequisites
1. System Demonstration Testing.
 2. Provide Owner with up-to-date record Drawings showing all components as they are installed. The record Drawings shall cover all major components of the System including power feed, control and alarm annunciation, and piping.
 3. Seven days written notice prior to proposed actual beginning of Startup date. Startup cannot commence without Owner and Engineer acceptance of proposed actual beginning of Startup date

1.10. SYSTEM DEMONSTRATION TESTING AND STARTUP MEETINGS

- A. At least seven days prior to the proposed start date for each System Demonstration Test, conduct a meeting with Owner and Engineer to review testing plans, finalize testing procedures, verify status of associated equipment and prerequisites, and coordinate all aspects of System Demonstration Testing and Startup. Representatives of the Owner, Engineer, and Contractor shall attend the conference.
- B. Prerequisites
1. Accepted System Demonstration Testing and Startup Plan.
 2. Completion of all associated Functional Testing.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01700
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-14.07.

1.03. RECORD DOCUMENTS

- A. The following supplements the requirements of GC-6.12:
 - 1. Recording, 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 or 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.

- I. Change in topographical contours of finished earth and paved surfaces.
 - m. Change in elevations of finished surfaces along route of installed Underground Facilities.
- B. 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.
- C. 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. SECTION INCLUDES

- A. Demolition and removal of site-related construction.
- B. Demolition and removal of architectural construction for minor remodeling of buildings.
- C. Demolition and removal of process equipment and piping.
- D. Demolition and removal of electrical construction.
- E. Demolition and removal of HVAC construction.
- F. Demolition and removal of plumbing construction.

1.02. RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK: Work sequence, Owner's continued occupancy.
- B. Section 01039 - COORDINATION: Alteration project procedures, Cutting and patching.
- C. Section 01300 - SUBMITTALS
- D. Section 01500 - TEMPORARY FACILITIES: Temporary enclosures, dust control, barricades, security at Owner-occupied areas, and cleanup during demolition operations.
- E. Section 01700 - RECORD DOCUMENTS: Project record documents.

1.03. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings
 - 1. Submit proposed demolition plan together with any necessary diagrams and/or drawings, taking into account Owner's continuing occupancy and sequence of construction of the project.
 - 2. Demolition plan shall include the following:
 - a. Demolition, removal, and disposition of items identified in this section and on the Contract Drawings.
 - b. Disposal locations of removed items.
 - c. Relocation of salvageable items.
 - d. Temporary storage of items to be reused.

- e. Time lines and sequences of operations.
- f. Location of temporary barricades, fences, and signs.
- g. Provisions for disposal of sludge, grit, debris, and hazardous materials (if any).

1.04. PROJECT RECORD DRAWINGS AND PHOTOGRAPHS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of capped utilities, subsurface obstructions.
- C. Provide pre-construction photography in accordance with Section 01380 prior to the start of demolition.

1.05. 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 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.

1.06. 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.

1.07. SEQUENCING

- A. Sequence demolition work to conform with provisions of Section 01010.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

- A. Thirty days prior to performing demolition that affects the operation of the existing pumps, there shall be a coordination meeting between the Contractor, Owner, and Engineer to discuss the Contractor's Demolition Plan and related procedures. Items to be discussed shall be, but not limited to, sequence of work, removal of material, protection of existing equipment, shutdown duration, etc. Demolition procedures must be coordinated with the Owner's operating personnel and operations, and adjusted accordingly, if necessary.

Following the coordination meeting, begin demolition operations after obtaining written authorization to proceed from the Owner.

- B. Notify Owner and Engineer at least 48 hours in advance of intended start of demolition operations in each affected area.
- C. Provide, erect, and maintain temporary barriers, signs, and security devices as required to maintain the security of the existing pump station.
- 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 and be disposed of in accordance with [the schedule in] Article 3.04.
- E. Dispose of rubble and non-metallic scrap off site in accordance with federal and New York State regulations.
- F. Dispose of designated hazardous materials, if applicable, 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. Disconnect cap, and identify utilities within demolition areas.
- C. 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.
- D. Carefully disconnect support, protect, and remove designated equipment to be reused on the project or salvaged for Owner's future use.
- E. All removed materials and equipment designated for reuse on the Project, or salvaged for Owner's future use, shall be stored at locations indicated in Article 3.04 and protected from damage and from deterioration by weather.
- F. Remove and dispose of demolished materials as work progresses. Do not burn materials; do not bury materials unless otherwise specified in Article 3.04.
- G. Patch and refinish existing visible surfaces which are to remain in accordance with Section 01039, and otherwise restore adjacent surfaces as specified in Article 3.04.
- H. Paint designated metal surfaces and reinforcing steel exposed by demolition operations, in accordance with Section 09900.
- I. Remove temporary barricades, partitions, signs, etc.
- J. Remove and dispose of residual materials such as grit, sludge, debris, trash, and other scrap.
- K. Upon completion of demolition operations, leave areas in a clean condition.

3.04. SCHEDULES

- A. The schedules herein are supplemental to the Contract Drawings and intended to provide additional detail regarding the disposition of equipment and accessories and the extent of demolition required. All material shall be disposed of by the Contractor at an appropriate off-site location unless otherwise noted below.
- B. Site-Related Construction
 - 1. Pavement to the limits shown on the Contract Drawings.
 - 2. Coordinate with the utility for the removal of the existing gas service and piping and installation of the new gas service. Demolish existing underground gas piping and gas service components as required by the utility.
 - 3. Bollards.
 - 4. Remove section of existing chain link fence as required for the installation of the new double leaf fence gate. Replace chain link fence as required to reconnect to new gate.
 - 5. Filling below-grade cavities and excavations (created by removed items) with approved material(s) in accordance with Section 02223.

C. Architectural Construction for Minor Remodeling of Buildings

1. Partial removal of roof systems, including flashings, gutters and downspouts, as needed for the installation of the building expansion.
2. Cut wall openings for installation of new piping as shown on the Contract Drawings.
3. Remove existing wall-mounted shelf/table.

D. Process Equipment and Piping

1. Ductile iron pump discharge piping, including associated fittings, valves, hangers, and supports.
2. 6-inch diameter flow meter.
3. Remove and relocate existing two polyethylene chlorine storage tanks and associated polyethylene containment bin.
4. Remove and relocate existing two peristaltic chemical feed pumps. Remove and dispose of existing pump shelves and pump suction tubing.
5. PVC chlorine feed piping and associated, fittings, valves, chemical injection assembly, and supports.
6. Chlorine analyzer and associated sensors, supports, and accessories. Existing copper piping, valves and strainers for the chlorine analyzer shall remain and be reused for the new chlorine analyzer.

E. Electrical Construction

1. Existing pump control panel. Prior to demolition, temporarily relocate panel, while maintaining existing wiring connections, as necessary to permit installation of the new pump control panel.
2. Electrical conduit, supports, and wiring including connections made to equipment, instrumentation systems, lighting systems, HVAC systems, and other electrified devices which are designated for removal.

F. HVAC Construction

1. Natural gas piping; removal and capping.
2. Exhaust fan and associated ductwork.
3. Vent and vent piping for the gas unit heater.
4. Motor-operated damper.

G. Plumbing Construction

1. Inside water piping and water sample piping as shown on the Contract Drawings. Associated fittings, valves, and supports.

2. Remove and relocate the existing eyewash shower.

END OF SECTION

SECTION 02112

DEMOLITION

PART 1 GENERAL

1.01. SECTION INCLUDES

- 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. RELATED SECTIONS

- A. Section 01500 - TEMPORARY FACILITIES
- B. Section 02225 - TRENCHING
- C. Section 02510 - ASPHALT CONCRETE PAVING

1.04. REGULATORY REQUIREMENTS

- A. Coordinate pavement cutting with utility companies.
- B. Conform to applicable local and state 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. Pavement 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

- 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 especially 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 referenced above. Unsound, soft or broken-up areas shall be excavated and replaced in accordance with Section 02510.
- C. Contractor shall dispose of all asphalt concrete removed by grinding.

END OF SECTION

SECTION 02205

PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Location of facilities.
- B. Notification of owners and authorities.
- C. Coordination and preparation.
- D. Protection of facilities.
- E. Relocation of facilities.
- F. Protection of sewers and storm drains.
- G. Protection of water mains near sewers.
- H. Abandonment of utilities.
- I. Restoration of property markers.

1.02. RELATED SECTIONS

- A. General Conditions.
- B. Section 01039 - COORDINATION: Preconstruction meeting.
- C. Section 01300 - SUBMITTALS: Construction photographs.
- D. Section 02222 - EXCAVATING

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) and 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. Exploratory excavations shall be in accordance with Section 02222.
- 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. In locations where blasting is to take place, and in cooperation with owners of nearby facilities, provide special protection and support of underground facilities which may be vulnerable to damage by virtue of their physical location or condition, and which could create hazardous conditions if damaged.
- D. 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.
- E. 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.
- F. 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. RELOCATION OF FACILITIES

- A. If the location or position of an existing gas or water pipe, public or private sewer or drain, conduit or structure be such as, in the opinion of Engineer, to require its removal, realignment or change, such alteration shall be without cost to the Contractor for the work of removal, realignment or change only.
- B. Uncovering, supporting and sustaining such facility before its removal or before and after its realignment or change, shall be the Contractor's responsibility as part of the work of his Contract.
- C. Contractor shall be entitled to extension of time for completion of entire Work as the Engineer determines that the entire Work was delayed by the removal, realignment or change of such obstruction.

3.06. 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. Existing sanitary sewer laterals damaged in the work or temporarily disconnected shall be restored to operation by the end of each work day. Existing sanitary sewer laterals crossing over new pipelines to be restored in accordance with details shown on the Drawings.
- C. 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.

3.07. 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:
 - 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.

3.08. 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's property yard.

3.09. 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. SECTION INCLUDES

- A. Excavation for building foundations.
- B. Excavation for slabs-on-grade, paving, and landscaping.
- C. Excavation for site structures.

1.02. RELATED SECTIONS

- A. Section 01400 - QUALITY CONTROL: Inspection of bearing surfaces.
- B. Section 01500 - TEMPORARY FACILITIES: Barriers, water controls, erosion and sediment controls.
- C. Section 02205 - PROTECTION OF EXISTING FACILITIES
- D. Section 02223 - BACKFILLING
- E. Section 02226 - ROCK REMOVAL

1.03. 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.
- B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.
- C. Notify utility company to remove and relocate utilities.
- D. Protect above- and below-grade utilities which are to remain.
- E. Protect plant life, lawns, 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. Contractor shall designate a "Competent Person" 29 CFR 1926.32(f) who shall be responsible for inspections of excavations on a daily basis and document and maintain daily trenching and excavation logs per OSHA 29 CFR 1926.

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 blasting methods, jackhammering or any other method suitable and safe considering the proximity of existing utilities or facilities.
 - d. Blasting operations shall conform to the requirements of Sections 02205 and 02226.
4. For this project, all excavated material shall be classified as common excavation until proven otherwise.

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, site structures, construction operations, and site utilities.
- C. Machine-slope banks to angle which is safe for specific material in which excavation is made.
- 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 Section 02223, and to the percentage compaction outlined therein. The cost of this refilling operation, including any tests associated therewith, shall be borne by Contractor.
- J. Remove excavated material from site.

3.04. EXPLORATORY EXCAVATIONS

- A. Where shown on the Drawings or ordered by the Engineer, the Contractor shall excavate and backfill test pits in advance of construction to determine conditions or location of existing facilities. The Contractor shall perform all work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling, and restoring the surface for the test pits.
- B. Test pits which the Contractor excavates that are not shown on the Drawings or specified or ordered by the Engineer shall be at the Contractor's expense.
- C. No test pits shall be dug prior to utility company stakeout.
- D. Backfill and Fill Materials - Backfill materials and compaction shall be as required for the location of the test pit. Backfill materials and compaction shall comply with Sections 02223 and 02228 of the Contract Documents.

3.05. DISPOSAL OF MATERIAL

- A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed of off-site.

- B. Reuse of excavated material as on-site fill shall conform with Section 02223.
- 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. A copy of said agreement shall be furnished to the Owner.

3.06. FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.
- B. Provide for visual inspection of bearing surfaces.

3.07. 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. SECTION INCLUDES

- A. Building perimeter and site structure backfilling to subgrade elevations.
- B. Site filling and backfilling.
- C. Fill under slabs on grade and paving.
- D. Classification of materials.
- E. Consolidation and compaction.

1.02. RELATED SECTIONS

- A. Section 01400 QUALITY CONTROL: Testing fill materials.
- B. Section 01500 - TEMPORARY FACILITIES
- C. Section 02141 – REMOVAL OF WATER
- D. Section 02222 - EXCAVATING
- E. Section 02228 - COMPACTION

1.03. 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

1.04. 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 materials proposed, notify the Engineer of the source of the material and furnish to the Engineer for acceptance, a representative sample weighing approximately 50 pounds at least 10 calendar days prior to the date of

anticipated use of such material. Except as specified herein, only off-site approved materials shall be utilized.

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, 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.

B. Geotextile Fabrics

1. Submit a 1 square foot sample of each geotextile to be used.
2. Submit manufacturer's specifications of average roll characteristics for standards ASTM geotextile tests for each geotextile to 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 outlined in Section 02110.

1. Unclassified Excavated Material

Type A-1 - Referred to as "excavated material" and from which all frozen material, boulders, trash, foreign debris, and material greater than 6 inches in any dimension has been removed. Approved Type A-1 material shall be used for all backfilling except under structures and over and around pipelines.

Type A-2 - Referred to as "select excavated material" and from which all frozen material, humus, peat, roots, vegetation, ashes, trash, debris, and rocks or stones greater than 2 inches in any dimension have been removed.

2. Classified Excavated Material - Where the Contract Documents allow the reuse of excavated on-site materials as a substitute for off-site sources of Type B gravel or sands, the minimum requirements for each of those excavated materials shall be the same as required for the equivalent off-site material. If such materials are used, submit for approval in writing the proposed methods of excavation, location of stockpiles, quantities of required sand and gravels, estimated excavation quantities and proposed excavation limits within the accepted excavation area. Provide a demonstration at least 10 days prior to commencement of excavation that the methods will provide consistent quantity and quality of material as specified for Type B gravels and sands. The Engineer will require subsurface investigations,

sampling, and testing to confirm the extent and quality of the proposed material. Cost of all investigations, sampling, and testing shall be the Contractor's responsibility.

B. Type E - Borrow Material

1. "Borrow material" is defined as approved on-site material required for fill or backfill in excess of the quantity of available approved material designated as Type A material.
2. No such borrow material shall be used on this project unless specified in the Contract Documents and except within the limits of borrow areas designated on the Drawings.
3. Approval of all borrow material must be obtained from the Engineer, and only material from approved sources shall be used.
4. Use of designated borrow areas shall be subject to the approval of the Engineer and Owner at all times. Test pits and analyses of borrow material shall be provided as required by the Engineer for each borrow area and at the expense of the Contractor. In addition, the Engineer may require full excavation and restoration plans for each borrow area. All borrow areas shall be stripped of topsoil and organic materials far enough in advance of operations that contamination of borrow material is prevented.

- a. Unclassified Borrow Material - This material consists of a naturally occurring mixture of sand, silts, clay, gravel, deteriorated rock or other inorganic particles.

Type E-1 - Referred to as "common borrow material," from which all frozen material, boulders, trash or debris have been removed.

Type E-2 - Referred to as "select borrow material" and from which all frozen material, humus, peat, roots, vegetation, ashes, trash, debris, and rocks or stones greater than 6 inches in any dimension have been removed.

- b. Classified Borrow Material - Where the Contract Documents allow the use of on-site borrow areas as a substitute for off-site sources of Type B gravels and sands, the requirements for each of those on-site materials shall be the same as off-site sources.

In addition, all of the requirements for "classified excavated material" (Type E material) must be met at least 10 days prior to the acceptance of approved borrow areas for use as a source of Type B gravel or sand.

2.02. 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.

A. Type B – 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. Each type of gravel fill material shall also meet the gradation requirements of Table 1.
4. Gravel Fill Materials
 - a. Type B-1 - Run-of-bank or R.O.B. gravel.
 - b. Type B-2 - Select granular fill.
 - c. Type B-3 - Screened gravel.
 - d. Type B-4 - Screened gravel subbase.

TABLE 1

GRADATION REQUIREMENTS: TYPE B – GRAVEL

SIEVE SIZE	PERCENT PASSING BY WEIGHT			
	GRAVEL TYPE			
	B-1	B-2	B-3	B-4
6"	100			
2"		100	100	100
1"				75-90
3/4"		75-90		55-85
1/4"				30-65
No. 4	25-70	20-65	30-95	
No. 8				
No. 10				
No. 20		10-45		
No. 40			5-50	5-40
No. 100				0-20
No. 200	0-12	0-10	0-8	0-8

B. Type C - Sand

1. Shall be a mixture of natural fine gravel and sand.
2. Shall be free from organic matter, trash, shale, debris, snow ice and other frozen or mechanically deleterious material.
3. Sand Materials
 - a. Type C-1 – Run-of-bank sand.

TABLE 2

GRADATION REQUIREMENTS: TYPE C – SAND

SIEVE SIZE	PERCENT PASSING BY WEIGHT
	SAND TYPE C-1
3/4"	100
3/8"	
No. 4	0-95
No. 8	
No. 16	
No. 30	
No. 50	
No. 200	2-10

C. 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 (1/4-inch nominal).
 - b. NYSDOT 703-0201, No. 2 stone (1/2-inch nominal).
 - c. NYSDOT 703-0201, No. 3 stone (1-inch nominal).
 - d. NYSDOT 703-0201, No. 4 stone (2-inch nominal).

D. Type E - Subbase Course

1. Shall be a mixture of blast furnace slag or of stone which is the product of crushing or blasting ledge rock, or a blend of blast furnace slag and of stone.
2. Shall be free from organic matter, trash, shale, debris, snow ice and other frozen or mechanically deleterious material.
3. NYSDOT Subbase Course Materials
 - a. 733-0404 – Subbase course, Type 4.

E. Type F - Gravel-Cement Mixtures

1. Shall be a mixture of 15 parts gravel to 1 part cement by weight.
2. Gravel shall be NYSDOT 733-0404, subbase course, Type 4.
3. Cement shall be Type I Portland cement.
4. Mixing of material shall be performed in an approved mixer.
5. The mixture shall be placed and compacted in accordance with Section 02228.

F. Required Materials

1. Trench Backfill
 - a. In Pavement, to Subbase - NYSDOT 733-0404, subbase course, Type 4.
 - b. Other Areas - Type A-1.
2. Trench Special Bedding - Use stone or gravel of the size and type as detailed on the Drawings or NYSDOT 703-0201, No. 2 or 3, depending on location if not otherwise shown.
3. Pipe Bedding - NYSDOT 733-0404, subbase course, Type 4.
4. Road Construction – As shown on the Contract Drawings.
5. Structural Fill Below Structures - NYSDOT 733-0404, subbase course, Type 4.
6. Backfill Adjacent to Structures - NYSDOT 733-0404, subbase course, Type 4.

2.03. ACCESSORIES

A. Geotextile Fabric Acceptable Manufacturers.

1. Separation - Tencate Mirafi 1100N; Carthage Mills FX 100 HS; or equal.
2. Filtration - Tencate Mirafi 180N; SKAPS Industries GE180; or equal.
3. Cushion - Tencate Mirafi S1600; SKAPS Industries GE116; or equal.
4. Reinforcement - Tencate Mirafi HP870; Carthage Mills FX 800 MF; or equal.

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.

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. Place and compact Type B backfill 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. 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 specified herein and shown on the Drawings. Flat-bottom trenches of required width shall be excavated to the necessary depth as required in the Table of Quantity Factors 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 8-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 from 4 to 8 inches deeper than the bottom of the pipe, depending on the diameter of the pipe (see details on the Drawings). Pipe bedding material, as described above and shown on the Drawings, 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 pipe bedding material remains between pipe and undisturbed trench bottom, as noted on the Drawings. Suitable holes shall be provided in the trench bottom to permit adequate bedding of bells, couplings, or similar projections. The bedding stone 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. Backfill material within 12 inches of the pipe shall be free of stones greater than 2 inches in any dimension.

3.04. BACKFILLING

- A. No fill or backfill material may be used without approval of the Engineer.
- B. Backfill areas to required contours, grades and elevations with unfrozen materials.

- C. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- D. 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.
- E. 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.
- F. 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.
- G. Place and compact fill materials in continuous layers to meet appropriate requirements of Table 1 of Section 02228.
- H. Employ a placement and compaction method consistent with Section 02228 that does not disturb or damage adjacent walls, drainage systems, damp-proofing, waterproofing, protective coverings, utilities in trenches, underground conduits or tanks.
- I. Maintain optimum moisture content of backfill materials to attain required compaction density.
- J. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- K. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- L. Slope grade away from building minimum 2 inches in 10 feet unless noted otherwise.
- M. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by backfilling operations.
- N. Maintain a stable, dry backfill area in accordance with Section 02141.
- O. Areas to receive compacted fill shall be graded to prevent surface runoff and ponding in accordance with Section 02110.
- P. 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.
- Q. Backfill material shall be within 2 percent of the optimum moisture content for that material.
- R. Any crushed gravel stockpiles which have undergone excessive particle segregation shall be reviewed and approved by the Engineer prior to placement.
- S. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradual. Blend slopes into level areas.
- T. Remove surplus backfill materials from site.
- U. Leave fill material stockpile areas completely free of excess fill materials.

3.05. PIPE TRENCH BACKFILL

- A. Pipe foundations, to a depth of 1 foot above the pipe, shall be placed in 12-inch layers and thoroughly compacted by approved mechanical methods to ensure firm bedding and side support. Refer to Section 02228 for density requirements. For plastic or polyethylene pipe materials, do not compact directly over pipe until the 2 feet of cover has been installed. Pipe foundations are specified in the appropriate sections covering underground piping. The remainder of the trench shall be backfilled and consolidated in accordance with Section 02228 and by one of the following methods, depending on the nature of backfill material and location of trench.
- B. Procedure I - For cross-country pipelines under uncultivated areas where subsequent settlement can be tolerated:
 - 1. Backfill material shall be placed in the trench and consolidated by packing with the backhoe bucket or other means to prevent voids. Refer to Section 02228 for density requirements. The top layer shall be thoroughly compacted mechanically and slightly mounded to allow for subsequent settlement. Maintain trench surface until completion of contract and regrade as necessary within guarantee period.
- C. Procedure II - For lawns, cultivated fields, gardens and non-paved areas where minimum subsequent settlement is required: Same as for Procedure I, refer to Section 02228 for density requirements. Top of back fill shall be compacted by mechanical means and surface maintained prior to topsoil installation, fine grading, and seeding.
- D. Procedure III - For streets, driveways, parking areas, highways, shoulder areas, miscellaneous type pavements, walks, curbs, gutters and other specified areas:
 - 1. Backfill material shall be placed in layers not exceeding 18 inches thick and each layer thoroughly 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 12 inches in thickness. Refer to Section 02228 for density requirements.
 - 2. For pipelines in or across state highways, backfill material and compaction shall conform with the standard specifications or specific requirements of the state in which the project is located.
 - 3. Where a gravel-cement mixture (Type F) backfill is specified, the dry gravel and cement mixture shall be placed in the trench, in 6-inch layers and thoroughly tamped using mechanical or vibratory tampers. Water shall not be introduced to the gravel-cement mixture during placing and compacting thereof.

3.06. BACKFILL FOR STRUCTURES

- A. Backfill shall be placed in layers not exceeding 8-inches thick and thoroughly compacted by mechanical means.
- B. Where pipelines or conduits are to be placed on structural backfill, all backfill under the pipes shall be NYSDOT 733-0404 subbase course, Type 4 placed in 8-inch layers and mechanically tamped, unless an alternate method of supporting such pipes is specified.

- C. 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.

3.07. 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.

3.08. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Tests and analysis of fill material will be performed in accordance with ASTM D1557 and with Section 02228.
- C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D2922, and with Section 01400.
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.
- E. Proof roll compacted fill surfaces under slabs-on-grade pavers and paving.

3.09. PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Section 01500.
- B. Regrade and recompact fills subjected to vehicular traffic.

END OF SECTION

SECTION 02226

ROCK REMOVAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Removal of subsurface rock encountered during excavation, utilizing mechanical methods.

1.02. RELATED SECTIONS

- A. Information Available to Bidders - Subsurface Report; bore hole locations and findings of subsurface materials.
- B. Section 02205 - PROTECTION OF EXISTING FACILITIES
- C. Section 02222 - EXCAVATING: Excavations for buildings and structures.
- D. Section 02223 - BACKFILLING
- E. Section 03300 - CAST-IN-PLACE CONCRETE

1.03. UNIT PRICES

- A. Rock Quantity - Determined by quantity of rock measured in the field in its undisturbed condition.

1.04. REFERENCES

- A. NFPA 495 - Code for Manufacture, Transportation, Storage, and Use of Explosive Materials.
- B. Code of Federal Regulations (CFR) - U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Construction Standards and Interpretation, 29 CFR Part 1926.
- C. Bureau of Alcohol, Tobacco and Firearms (BATF) - Title XI, Regulation of Explosives (18 U.S.C. Chapter 40; 84 Statute 952) of the Organized Crime Control Act of 1970 (84 Statute 922) and 27 CFR 55.
- D. Department of Transportation (DOT) - Title 49 (49 CFR), Parts 106, 107, 171-179, 383, and 390-399.
- E. United States Department of the Interior, Bureau of Mines Report of Investigations 8507, "Structure Response and Damage Produced by Ground Vibration From Surface Mine Blasting."

1.05. 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.

1.06. REGULATORY REQUIREMENTS

- A. Obtain permits from authorities having jurisdiction before drilling is started.

1.07. SCHEDULING

- A. Schedule work to avoid disruption to occupied buildings nearby.
- B. Schedule work to minimize disruption of vehicular traffic in nearby public thoroughfares.
- C. Coordinate schedule with local police and fire departments, including owners of nearby existing facilities.
- D. Schedule Work to coordinate with concrete placement.

1.08. 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.

1.09. ORDER OF WORK

- A. After the rock profile is determined, proceed with rock removal in accordance with the approved plan of action.
- B. The Contractor shall schedule his operations so that all rock excavation within 100 feet of any proposed structure is completed before any structure work is started.

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. Reference Section 02205.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum; establish quantity of rock to be removed to meet project requirements.

3.03 ROCK REMOVAL - GENERAL

- A. Allow time for Engineer to take site measurements of rock quantities to be removed.
- B. Cut away rock at bottom of excavation to form level bearing surface for foundations of buildings and structures.
- C. Remove shaled layers to provide sound and unshattered base for footings, foundations, and pipe bedding.
- D. In utility trenches, trim rock to 4 inches below bottom of installed pipe and 12 inches wider than outside diameter of installed pipe.
- E. Remove excavated materials from site and reuse for site backfill and/or landscaping as approved.
- F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Sections 02223 and 03300 under direction of Engineer.

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. SECTION INCLUDES

- A. Compaction requirements and test methods.
- B. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

1.02. RELATED SECTIONS

- A. Section 01400 - QUALITY CONTROL: Inspection and testing by laboratory services.
- B. Section 02223 - BACKFILLING

1.03. 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

1.04. SUBMITTAL

- A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

1.05. 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.

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 pounds 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 (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	8	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	18	D1557	90%
d. Backfill under lawns, gardens and cultivated fields	24	D1557	90%
e. All other trenches***	36	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	18	D1557	90%
c. Rough site grading	24	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 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.
2. Testing will be done by a qualified, independent testing laboratory in accordance with this section and Section 01400.
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. A minimum of two tests will be performed.
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 reimburse the owner for the cost of the test and shall replace all material included in that lift or section, replace with acceptable material, and compact to specifications, at no additional compensation.
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 8 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, if allowed on site, 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 02231

AGGREGATE BASE COURSE

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Aggregate base course roads, driveways, walks, and parking areas.
- B. Compaction.
- C. Fine grading.
- D. Testing.
- E. Tolerances.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01400 - QUALITY CONTROL
- C. Section 01500 - TEMPORARY FACILITIES
- D. Section 02223 - BACKFILLING: Off-site materials.
- E. Section 02228 - COMPACTION
- F. Section 02510 - ASPHALT CONCRETE PAVING

1.03. REFERENCES

- A. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates
- B. ANSI/ASTM D1557 - Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb Rammer and 18 inch Drop
- C. ANSI/ASTM D1556 - Density of Soil in Place by the Sand Cone Method
- D. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
- E. Nuclear Moisture-Density Testing by "Probe" Methods
- F. NYSDOT Manual of Uniform Traffic Control Devices.

1.04. DEFINITIONS

- A. "Aggregate base course" shall be defined as the foundation course of the subsequent pavement layers.

1.05. PERFORMANCE REQUIREMENTS

- A. Compaction of aggregate base course shall meet the requirements of Section 02228.
 - 1. Compaction curves shall be developed for each type of aggregate base course material when "in-place" density tests are required by the Engineer.
 - 2. The cost of failed compaction tests will be reimbursed by the Contractor.

1.06. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit aggregate base course materials.
 - 1. Certified sieve analysis with the following quality tests:
 - a. Soundness.
 - b. Plasticity Index.
 - c. Elongated particle.

1.07. ENVIRONMENTAL REQUIREMENTS

- A. Provide erosion and sediment controls. Refer to Section 01500 and the Contract Drawings.

1.08. COORDINATION

- A. Coordinate field work under provisions of Section 01500, including maintenance of traffic, access to private driveways, and emergency vehicle access.
- B. Coordinate work with local utility companies (private and municipal) including owners of other existing utilities for location and protection thereof.
- C. Coordinate shutdown of streets and/or driveways with local authorities. Notify effected property owners and industries at least 24 hours prior to shutdown including duration of shutdown if so approved by local authorities.

PART 2 PRODUCTS

2.01. OFF-SITE MATERIAL

- A. Aggregate Base Material – NYSDOT 733-0402, subbase Type 2 as described in Section 02223.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify pavement subgrade has been accepted for placement of aggregate base course.
 - 1. Gradients, crowns and elevations are correct.

2. Subgrade is dry.
 3. Geotextile is in place.
- B. Verify that traffic controls are in place.

3.02. INSTALLATION

- A. Spread aggregate over prepared subgrade to a total compacted thickness as shown on the Drawings.
- B. Place aggregate in 8-inch maximum layers and compact.
- C. Level and contour surfaces to elevations and gradients shown.
- D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- E. Compact placed aggregate materials to achieve compaction to 95 percent of its maximum dry density in accordance with ANSI/ASTM D1557.
- F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- G. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.

3.03. TOLERANCES

- A. Flatness - Maximum variation of 1/4-inch measured with 10-foot straight edge.
- B. Scheduled Compacted Thickness - Within 1/4-inch.
- C. The final base course surface shall be free from holes, bumps, waves and corrugations.
 1. Surface shall be parallel to the final surface course and have a tolerance of $\pm 3/8$ -inch of its design gradient and elevation.

3.04. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Gradation of Aggregate - In accordance with ASTM C136.
- C. Compaction testing will be performed in accordance with ANSI/ASTM D1557 and with Sections 01400 and 02228.
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.
- E. Frequency of Tests - Refer to Section 02228 for compaction requirements.

3.05. PROTECTION

- A. In the event the subbase is used for maintenance of traffic or is disturbed or loosened by any cause, then prior to placing of the next paving course, the subbase shall be regraded and recompactd to its finished grade and specified density.

3.06. DUST CONTROL

- A. Dust control shall be accomplished by using water, brooming and cleaning methods. Dust control shall be carried out on a daily basis including weekends and holidays. See Section 01500.

END OF SECTION

SECTION 02510
ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Asphalt concrete paving and surface sealer; wearing, top course, binder, or base course.
- B. Driveways and parking areas.
- C. Road shoulders.
- D. Compaction.
- E. Tolerances.
- F. Field quality control.

1.02. RELATED SECTIONS

- A. Section 01039 - COORDINATION
- B. Section 01300 - SUBMITTALS
- C. Section 02112 - PAVEMENT CUTTING
- D. Section 02223 - BACKFILLING
- E. Section 02228 - COMPACTION
- F. Section 02231 - AGGREGATE BASE COURSE

1.03. REFERENCES

- A. New York State Department of Transportation (NYSDOT) Standard Specifications, latest edition.
- B. NYSDOT - Manual of Uniform Traffic Control Devices.

1.04. 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.

1.05. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit certification of plant job mix formulas that have been approved by the NYSDOT.
- C. Traffic control plan in accordance with the Manual of Uniform Traffic Control.

1.06. PROJECT RECORDS

- A. Submit Marshall Test reports of asphalt concrete.

1.07. QUALITY ASSURANCE

- A. Perform work in accordance with the NYSDOT Standard Specifications, latest edition, 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.
- C. Obtain asphalt concrete materials from same source throughout project.

1.08. 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 & 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.

1.09. COORDINATION

- A. Coordinate field work under provision of Section 01039 including maintenance of traffic, access to private driveways, and emergency vehicle access.

1.10. 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 shut-down.
 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.

1.11. 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 CONCRETE

- A. Binder Course - The pavement binder course shall be constructed of the type described below and as shown on the Drawings. Binder course material shall be laid to a width and depth shown on the Drawings. Temperature range 250 to 325 degrees F.
 1. Type 3, Asphalt Concrete - This binder course shall be NYSDOT Type 3, per NYSDOT Table 403-1. Final compacted thickness shall be as shown on the Drawings, but not less than 2 inches.
- B. Shim-Course (Trueing and Leveling) - The shim course shall be constructed of one of two types described below and in the NYSDOT Standard Specifications, Table 403-1. Temperature range 250 degrees F to 325 degrees F.
 1. Type 5, Asphalt Concrete - This shim course shall be NYSDOT Type 5, for compacted thicknesses up to 1-1/2 inches.
 2. Type 3, Asphalt Concrete - This shim course shall be NYSDOT Type 3 for compacted thickness required over 1-1/2 inches in depth.
- C. Pavement Wearing Course (Top Course) - Pavement wearing course construction shall be the type described below and as shown on the Drawings. The wearing course shall be constructed to a width and depth as shown on the Drawings.
 1. Type 7, Asphalt Concrete - This wearing course shall be NYSDOT Type 7 and/or Type 7F, per NYSDOT Table 403-1. Final compacted thickness shall be as shown on the Drawings, but not less than 1 inch. (The "F" designation indicates that high friction course aggregates are required.) Temperature range from 250 to 325 degrees F.
- D. Surface Treatment - Surface treatment of paved or unpaved areas shall be one of the types described below, and as shown on the Drawings. Aggregates, bituminous material and constructor details shall comply with NYSDOT Standard Specification 410.
 1. Type M, Bituminous Surface Treatment (Single Course for Pavement) - This surface treatment shall be constructed as specified in NYSDOT Standard Specification Section 410.

2. Type N, Bituminous Surface Treatment (Double Course Pavement) - This surface treatment shall be constructed as specified in NYSDOT Standard Specification Section 410.
3. Type O, Bituminous Surface Treatment (Single Course for Shoulders) - This surface treatment shall be constructed as specified in NYSDOT Standard Specification Section 410, Part 410-3.02.

E. Tack Coat

1. NYSDOT - Tack coats of asphalt emulsions, Type 702-6, Table 702-9, shall be furnished and applied in accordance with NYSDOT Specification Section "407 - Tack Coat." Prior to placing the next course, the asphalt shall be allowed to cure per manufacturer's recommendations.

2.02. GEOTEXTILE FABRICS - REINFORCED ASPHALT CONCRETE OVERLAYS

- A. Geotextile fabric shall be provided in accordance with Section 02223.

2.03. SOURCE QUALITY CONTROL

- A. Provide certification of state approved job mix formulas for types to be used on this project.

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.
 - a. Verify base conditions under provisions of Section 01039.
 - b. Verify that compacted subgrade granular base 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.
 4. Contractor shall completely replace driveway apron from trench to the road edge of pavement if trench is within 10 feet of road edge.
- 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.
 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.
 5. Asphalt concrete removed by these processes shall be properly disposed.

3.03. PREPARATION - PRIMER

- A. Apply primer in accordance with manufacturer's instructions and NYSDOT standards.
- B. Apply primer to contact surfaces of curbs and gutters.

3.04. PREPARATION - TACK COAT

- A. Apply tack coat in accordance with manufacturer's instructions and NYSDOT standards.
- B. Apply tack coat to contact surfaces of curbs, gutters, and existing vertical surfaces.

3.05. INSTALLATION

- A. Install work in accordance with NYSDOT standards.
- B. Place asphalt within four hours of applying primer or 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 - Three roller compaction train.
 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 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.
- H. Areas inaccessible to rollers shall be compacted using vibratory pans, making a minimum of two passes on each course. Hand tamps shall be used for small areas not otherwise compacted.
- I. At the end of each work day, when placing top course material, the face of each paving lane shall be ended by the placing of a 2-inch x 4-inch or suitable sized board perpendicular to the pavement and shimmed with asphalt concrete to provide a driving surface such that the board and shim material can be easily removed and a vertical face retained for butting the start of the new pavement on the following work day.

3.07. SEAL COAT

- A. Apply seal coat to surface course and asphalt curbs in accordance with NYSDOT standards.

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.

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 02524
CONCRETE CURBS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Concrete curb.
- B. Reinforcing.
- C. Replacement of existing curb.
- D. Base preparation and subgrade.
- E. Placing, finishing, curing.
- F. Tolerances.

1.02. RELATED SECTIONS

- A. Section 02223 - BACKFILLING
- B. Section 02231 - AGGREGATE BASE COURSE
- C. Section 02980 - SITE REHABILITATION
- D. Section 03200 – CONCRETE REINFORCEMENT
- E. Section 03300 – CAST-IN-PLACE CONCRETE

1.03. REFERENCES

- A. ASTM C309 - Liquid membrane forming compounds for curing concrete.
- B. ASTM D1751 - Preformed expansion joint filler for concrete paving and structural construction.
- C. NYSDOT Standard Specifications, dated January 2, 1990.

1.04. PERFORMANCE REQUIREMENTS

- A. It shall be the Contractor's responsibility to perform all work within the prescribed temperature, moisture and weather limitations imposed herein, NYSDOT specifications and by Division 3 specifications.
- B. Competent, experienced concrete finishers shall be employed for this work.

1.05. SUBMITTALS

- A. Submit curing procedures and single-page catalog cuts of any proposed curing products.
- B. Submit catalog cuts for concrete sealer and joint sealant.

1.06. QUALITY ASSURANCE

- A. Perform work as described herein and in accordance with Division 3 specifications.

1.07. REGULATORY REQUIREMENTS

- A. Conform to applicable NYSDOT Standards for constructing curbs or gutters on public property.

1.08. ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when surface is less than 45 degrees F or when temperature is 45 degrees F and falling or when surface is frozen.
 - 1. Protect surface of freshly placed concrete from adverse weather conditions, rain, freezing and damage or defacement from vandalism.

PART 2 PRODUCTS

2.01. FORM MATERIAL

- A. Forms shall be of a smooth metal of the size and shape conforming to the proposed curb dimensions.
 - 1. Forms shall be of sufficient structural strength to hold their shape true to line and grade against all forces induced while placing and vibrating concrete.

2.02. CURING MATERIAL

- A. Curing shall be either waterproof paper blankets, quilted covers, polyethylene curing covers, or clear or white pigmented membrane curing compound.
 - 1. Selection of materials and methods shall provide protection from freezing.
- B. After the seven-day cure, a protective sealer shall be sprayed on the exposed concrete surface; use Sika Corporation "Sikagard 701W," Anti-Hydro "Clear Cure," or equal.
 - 1. The sealer to be applied in accordance with the manufacturer's recommendations. Coordinate with the membrane curing compound if used.

2.03. AGGREGATE BASE

- A. For projects located in New York State, aggregate base course material shall be NYSDOT subbase course 733-0402 Type 4 as described in Section 02223 or as shown on the Drawings.
- B. In the event no aggregate base is specified or shown, the Contractor shall furnish and install a minimum of 6 inches of crushed stone as a base course for curb construction.

2.04. CONCRETE CURB AND GUTTER

- A. Concrete shall achieve a nominal 28-day strength of 5,000 psi, with 5 percent to 7 percent air entrainment.

2.05. REINFORCING

- A. Reinforcing steel shall be provided in all curbs and gutters and shall be in accordance with the requirements of Section 03200.

2.06. PREMOULDED JOINT FILLER AND JOINT SEALANT

- A. Expansion joint material shall be bituminous joint filler in accordance with ASTM D-1751.
- B. Joint sealant to be a grey polyurethane sealant.
 - 1. Acceptable products are "Sika-Flex 1CSL" by Sika Corporation, "Sonolastic SL2" by Sonneborn, or equal.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that subgrade has been properly graded and compacted to receive aggregate base course.
- B. Verify that aggregate base course is properly compacted and graded to receive concrete.
- C. Verify forms are correctly placed true to line and grade.
- D. The finish grade and alignment of curb replacements to match existing conditions, jointing and shape that existed prior to removal, unless otherwise shown on the Drawings or specified herein.

3.02. PREPARATION

- A. Prior to the start of each day's concrete or gutter placement, the concrete curb or integral curb and gutter forms shall be placed and graded to the proper alignment and grade shown on the Drawings.
- B. Forms shall be held rigidly in place and braced to withstand all forces of placing and vibrating concrete.
- C. Subgrade - The subgrade shall be free of all bumps, depressions, standing water, organic material and all deleterious material and compacted to a smooth surface, parallel to the final surface.
- D. Aggregate Base - Furnish and install aggregate base under the concrete curb or gutter or integral curb and gutter in accordance with Section 02231 and as shown on the Drawings.
- E. Curb Replacement - When existing curb is being replaced, the existing curb shall be removed to the nearest joint.
 - 1. In all cases the horizontal and vertical faces of the new curb shall be flush with the face of the existing curb.
 - 2. Grading of the new curb, gutter or integral curb and gutter shall be performed so as to continue drainage in its existing pattern.

- F. Tree roots which interfere with the proposed curb alignment shall be removed to provide a 6-inch clearance between root and back edge of curb or gutter.
- G. Other obstacles such as power poles or street lights which interfere with curb alignment shall remain in place and the alignment of the curb adjusted as approved by the Engineer.

3.03. INSTALLATION

- A. Dimensions of the proposed curbs, gutters or integral curb and gutter are shown on the Drawings; however, all concrete curbs shall have a minimum height of 18 inches and a minimum thickness of 6 inches. Gutters shall have a minimum thickness of 6 inches.
- B. All curbs and gutters shall be installed to a straight alignment parallel to the centerline of the road, or along the required radius or curvature shown on the Drawings, or along the line which existed prior to construction.
- C. Reinforcing steel shall be 4 x 4 - W4.0 x W4.0 welded wire fabric or continuous #4 reinforcing bars.
- D. Curbs, gutters or integral curb and gutter shall be cast in place in sections approximately 15 feet long, and provision made at each joint for expansion.
 - 1. Expansion joints 1/2 inch in width shall be located opposite each pavement or sidewalk expansion joint.
 - 2. Expansion joint material shall be premolded bituminous, cut to conform to the cross section of the curb and be set slightly indented.
- E. The fresh concrete shall be thoroughly vibrated without damage or misalignment of the forms.
 - 1. The vibrator shall be introduced into the concrete at 1-foot intervals for a period of at least 2 seconds for each immersion and shall vibrate at not less than 5,000 impulses per minute.
- F. The final horizontal surface of curbs or gutters shall be leveled, floated and allowed to "set" slightly prior to the final finishing.
- G. New or replacement concrete curbs or integral curb and gutter at crosswalks shall be constructed to the standards for access by physically handicapped persons and in accordance with the details shown on the Drawings.

3.04. FINISHES

- A. The forms shall be left in place until the concrete has set sufficiently so that they can be removed without injury or marking of the curb.
 - 1. Upon removal of the forms, the curb shall be immediately troweled or rubbed to a smooth and uniform surface. No plastering will be permitted.
- B. The finish shall be smooth, free of trowel marks, uniform in texture and appearance, and within the stated tolerances.
- C. The top face edge of the curb shall be finished with an edging tool having a 1-inch radius and the top back edge of the curb shall be finished with an edging tool having a 1/4-inch radius.

- D. The front edge of the gutter shall be finished with an edging tool having a 1-inch radius.

3.05. CURING

- A. Concrete shall be kept covered and moist for a period of seven days and protected from damage by vehicles and from freezing.
 - 1. The curb and/or gutter shall be cured with one of the types described previously.
 - 2. After curing is complete, the exposed concrete surfaces are to be sealed with a liquid-applied sealant.
- B. Where necessary to provide vehicular access, before the curing period is completed, provide suitable bridging or plates to allow passage of vehicles without damaging the concrete curb and/or gutter.

3.06. TOLERANCES

- A. Finished subgrade shall be $\pm 1/2$ inch of its proposed grade.
- B. Finished grade of the aggregate base course shall be $\pm 1/4$ inch of its proposed grade.
- C. Finished curb, gutter or integral curb and gutter surfaces shall present a neat, uniform and continuous line with no apparent dips, high spots or bulges, or variations in line or grade greater than 1/8 inch as measured by a 10-foot straight edge.
 - 1. Gutters shall not vary from the design grade shown on the Drawings by more than 1/8 inch in each 10-foot section.

3.07. GRADING

- A. Grading in back of curbs, either new or reset, shall conform to the details shown on the Drawings.
 - 1. When no specific details are shown, the Contractor shall backfill with compacted screened (maximum 2 inch size) gravel to driveway or walk subbase or to within 2 inches of top of curb if in lawn areas.
 - 2. The remaining depth to be backfilled with topsoil and lawn restored per Section 02980. Slope backfilled area to drain from sidewalk to curb.

END OF SECTION

SECTION 02675

DISINFECTION OF WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Disinfection of all pipes, fittings, and valves.
- B. Sampling tests of residual chlorine content.
- C. Flushing of water distribution system and its disposal of spent chlorine solutions.
- D. Sampling tests of total coliform.
- E. Project records.

1.02. RELATED SECTIONS

- A. Section 01700 - RECORD DOCUMENTS
- B. Section 15060 - INSIDE PROCESS PIPING

1.03. REFERENCES

- A. AWWA C651 - Disinfecting Water Mains.
- B. County and New York State Department of Health regulations.

1.04. DISINFECTION

- A. All pipe and fittings, valves and hydrants connected to and forming part of a potable water supply system shall be disinfected in full accordance with both the requirements of AWWA Standard C651, the State (or County) Department of Health having jurisdiction over project and as modified herein.
- B. Disinfection shall be done by the continuous feed method (per AWWA C651).
- C. The Contractor shall bear all costs of flushing, disinfection and coliform testing.

1.05. SUBMITTALS

- A. Disinfection plan, which shall include location of taps, sampling points, and schedule. Plan shall describe the method and rate of chlorine addition and the anticipated flow through the main being disinfected.

1.06. PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700.
- B. Attached to the end of this section is a Disinfection, Testing, and Flushing of Water Mains Tabulation Sheet for disinfection, testing, and flushing. Engineer shall fill out form at the time of testing and both Contractor and Engineer shall sign upon completion.

1.07. REGULATORY REQUIREMENTS

- A. Submit proof of testing and disinfection as required by county and/or state Health Departments.
- B. Dispose of chlorinated water in accordance with the requirements of the state and local agencies with jurisdiction over the release of potential contaminants to the environment.

1.08. FIELD MEASUREMENTS

- A. Measurements required to complete the Disinfection, Testing, and Flushing of Water Mains Tabulation Sheet.
- B. Measurements required by county and/or state Health Departments.

1.09. COORDINATION

- A. Provide 48-hour notice to local Water Department (Owner) when water for flushing and disinfection is required.
- B. Owner of existing water system to operate all valves and hydrants unless Contractor has been specifically authorized to operate water system valves and hydrants.

PART 2 PRODUCTS

2.01. WATER SUPPLY

- A. Owner shall supply water at no cost to the Contractor for initial tests. Additional water needed due to failure of test shall be Contractor's responsibility.

PART 3 EXECUTION

3.01. EXAMINATION

- A. All pressure and leakage tests of the water system shall be completed prior to start of disinfection. See Section 15060.

3.02. PREPARATION

- A. Contractor to employ methods to prevent contaminating materials from entering the water mains during storage, construction, or repair.
- B. All piping systems, valves and hydrants shall be thoroughly flushed of any dirt or contaminating materials that may have entered the water system.
- C. Mechanical methods shall be used to clean the mains if the dirt or debris will not be removed by the flushing operations.

3.03. DISINFECTION

- A. The continuous feed method shall be used for chlorine application.
- B. The introduction of solid hypochlorite (granules) directly into the system is prohibited.

- C. Injection point shall be within 10 feet of the water source.
- D. The new water main shall be filled with not less than 50 mg/L nor more than 100 mg/L of available chlorine and retained in the system for not less than 24 hours.
 - 1. When filling water main with chlorinated water, each hydrant (in consecutive order) shall be flushed until the required residual is measured.
- E. At the end of the 24-hour period, the disinfected water shall contain no less than 25 mg/L available chlorine throughout the system.
- F. Disinfection shall be repeated as often as necessary at the Contractor's cost until the minimum residual chlorine of 25 mg/L has been maintained.

3.04. FLUSHING AND DISPOSAL

- A. The chlorine solution shall be thoroughly flushed out prior to testing for total coliform.
- B. The Contractor shall dispose of the spent chlorine solutions in a manner acceptable to the Owner and regulatory agencies and where its effects will not be detrimental to animal, plant or fish life.

3.05. TOTAL COLIFORM TESTING

- A. After final flushing and before the water main is placed in service, a water sample or samples shall be collected from the new main. At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set from the end of the line, and at least one set from each branch. All samples shall be tested for bacteriological quality, showing the absence of coliform organisms, in accordance with the local and/or state Health Department procedures.
- B. Analyses shall be performed by state-certified laboratories.
 - 1. Engineer shall accompany Contractor and witness delivery of all samples to the laboratory.
- C. If the initial disinfection fails to produce satisfactory bacteriological results, the new main may be refushed and shall be resampled at Contractor's cost. If check samples also fail to produce acceptable results, the Contractor shall repeat all disinfection procedures until satisfactory results are obtained.
- D. After approval from the local/state Health Department and the Owner, the water mains shall be placed in service.

3.06. SERVICES

- A. After construction of services but prior to connection to home or commercial service line, the service shall be thoroughly flushed to remove any contaminant and to disinfect the new service.

DISINFECTION, TESTING, AND FLUSHING OF WATER MAINS TABULATION SHEET

Date _____ Weather _____ Temperature _____

Section Tested _____ ft. of ____-inch diameter pipe

Discharge Rate _____ gpm; application of _____% hypochlorite solution @ gpm

_____ mg/L initial total chlorine residual @ end of line at _____ (time)

_____ mg/L initial total chlorine residual @ end of 24 hours at _____ (time)

Method of measuring chlorine residual _____

Line flushed at _____ gpm for _____ hours _____ minutes on _____ (date)

Bacteria sample collected at _____ (location) at _____ (time/date)

Bacteria sample results _____ meet _____ do not meet state and/or county drinking water standards for total coliform.

Line Ready for Service on _____ (date) _____ (time)

Line Put Into Service on _____ (date) _____ (time)

Owner's Representative _____

Contractor's Representative _____

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 fences, ditches, drains, culverts, drives, posts, 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. RELATED SECTIONS

- A. Section 01026 - LUMP SUM ITEM: Requirements applicable to lump sum prices for the work of this Section.
- B. Section 01039 - COORDINATION
- C. Section 01300 - SUBMITTALS
- D. Section 02110 - SITE CLEARING
- E. Section 02223 - BACKFILLING: Rough grading.

1.03. REFERENCES

- A. The American Association of Nurserymen Standards - ANSI Standard 2-60.1, "Nursery Stock."
- B. Soil Conservation District of the Department of Agriculture.

1.04. 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.

1.05. SUBMITTALS

- A. Submit under provisions of Section 01300.
- 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.

1.06. QUALIFICATIONS

- A. All planting material to be furnished from a nursery which meets the requirements of the American Association of Nurserymen.

1.07. 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.

1.08. 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.

1.09. 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.

1.10. 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.

1.11. 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 transported and spread from previously excavated, stockpiled, and protected materials and supplemented with topsoil from off-site sources in areas to receive restoration, lawn, and plantings.
2. Topsoil may be naturally occurring or may be manufactured and shall come from an approved source. Manufactured topsoil is a mixture of materials comprised of a mineral (soil) component that by itself does not exhibit the properties and characteristics of topsoil, an organic material component consisting of compost(s). Organic material, and amendment(s), such as limestone that, when combined together, meet the requirements for topsoil.
3. Topsoil shall be free from refuse, material toxic or otherwise deleterious to plant growth, subsoil, seeds or other viable propaques of invasive plants, woody vegetation roots, stumps, stones larger than 2 inches, sticks, and other foreign substances.
 - a. Topsoil shall contain less than 52 percent sand.
4. The pH of topsoil shall be between 5.5 and 7.6.
5. Topsoil shall contain no less than 6.0 percent and no more than 12 percent organic matter (dry weight basis).

6.

Gradation	Sieve Size Percent Passing by Weight
2 inch	100
1 inch	85 to 100
1/4 inch	65 to 100
No. 200	20 to 65
2 micron particle	0 to 20

7. All topsoil shall be tested by an independent laboratory or Cornell Extension sources at the contractor's expense. Stockpiled topsoil shall be tested for the purpose of providing soil amendments for proper plant growth. Off-site topsoil shall be tested to ensure that it conforms to the specified requirements. Testing shall be completed and the results reviewed and approved by the Engineer before topsoil is spread from site stockpiles or delivered to the site from offsite sources.
8. Topsoil may be from previously excavated, stockpiled and protected materials, provided the materials meet the requirements for topsoil.

B. Fertilizer

1. General Fertilizer
 - a. Unless otherwise specified on the Contract Drawings, fertilizer shall be a complete, partially organic, commercial 10-6-4 fertilizer.
 - b. General 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 mix shall be as specified on the Contract Drawings. All seed shall be fresh, recleaned and of the latest crop year. Each component shall meet or exceed the minimum state and federal requirements for purity and germination for that component.
- D. Mulch for Tree or Shrub Plantings - Mulch shall consist of dry, clean, hardwood chips.
- E. Mulch for Seeded Areas – As specified on the Contract Drawings and free from noxious weeds and other materials which may interfere with the establishment of a healthy stand of grass.

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. 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.
- B. The soil shall be uniformly compacted with a light hand roller to a final depth of not less than 6 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 shown on the Contract Drawings.
 - 1. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading.

3.06. SEEDING

- A. Seed shall be applied at a rate of not less than 6 lbs. per 1,000 square feet, using a hand operated or 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. 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.

3.08. 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 refertilized at one-half rate and protected and maintained until such a full stand has been obtained.

3.09. 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 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install concrete formwork. The work also includes:
 - a. Providing openings in formwork to accommodate the work under this and other Sections and building into the formwork all items such as sleeves, anchor bolts, inserts and all other items to be embedded in concrete for which placement is not specifically provided under other Sections.
 - b. Providing openings in formwork to accommodate the work under other contracts and assisting other Contractors in building into the formwork all items such as sleeves, anchor bolts, inserts and all other items required to be embedded in concrete under other contracts.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the formwork.
2. Notify other Contractors in advance of the construction of the formwork to provide the other Contractors with sufficient time for the installation of items included in their contracts that must be installed with the formwork.
3. Coordinate formwork specifications herein with the requirements for finished surfaces specified in Section 03300, Cast-In-Place Concrete.

C. Related Sections:

CONCRETE REINFORCEMENT	Section 03200
CONCRETE JOINTS	Section 03251
CAST-IN-PLACE CONCRETE	Section 03300

1.02 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. ACI 301, Specifications for Structural Concrete for Buildings.
2. ACI 347, Guide for Concrete Formwork.
3. US Product Standard, PS-1-83 for Construction and Industrial Plywood.

B. Allowable Tolerances:

1. Construct formwork to provide completed concrete surfaces complying with tolerances specified in ACI 347, Chapter 3.3, except as otherwise specified.

C. All items for permanent or temporary facilities shall be used in accordance with manufacturers instructions.

1.03 SUBMITTALS

A. Shop Drawings:

1. Submit for approval the following:
 - a. Fabrication and erection drawings of formed concrete surfaces as shown or specified. Show the general construction of forms including jointing, special formed joints or reveals, rustication, location and pattern of form tie placement, and other items which affect the finished concrete visually. Owner=s review will be for general purposes and features only. Design of formwork for structural stability and sufficiency is Contractor's responsibility.
2. Submit for information purposes the following:
 - a. Copies of manufacturer's data and installation instructions for proprietary materials, including form coatings, manufactured form systems, ties and accessories.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. On delivery to job site, place materials in area protected from weather.
- B. Store materials above ground on framework or blocking. Cover wood for forms with protective waterproof covering. Provide for adequate air circulation or ventilation.
- C. Handle materials to prevent damage.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Forms for Exposed Finish Concrete:

1. Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced or other panel type materials acceptable to Owner, to provide continuous, straight, smooth as-cast surfaces. Furnish in largest practical sizes to minimize number of joints and to conform to joint system shown or specified. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

B. Forms for Unexposed Finish Concrete:

1. Form concrete surfaces that will be unexposed in the finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least two edges and one side.

C. Form Ties:

1. Provide factory-fabricated, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling of concrete surfaces upon removal. Materials used for tying forms will be subject to approval of Owner.
2. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 inch from the outer concrete surface. Unless otherwise shown, provide form ties that will leave a hole no larger than 1-inch diameter in the concrete surface.
3. Provide wood or plastic cones for ties, where concrete is exposed in the finish structure and in the interior of tanks.
4. Wire ties are not acceptable.

D. Forms Coatings:

1. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds. For concrete surfaces which will be in contact with potable water, the form coating shall be a mineral oil base coating.

2.02 DESIGN OF FORMWORK

- A. Design, erect, support, brace and maintain formwork so that it shall safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system or in-place construction that has attained adequate strength for this purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Design forms and falsework to include values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
- C. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
- D. Support form facing materials by structural members spaced sufficiently close to prevent significant deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances. For long span members without intermediate supports, provide camber in formwork as required for anticipated deflections resulting from weight and pressure of fresh concrete and construction loads.

- E. Design formwork to be readily removable without impact, shock or damage to concrete surfaces and adjacent materials.
- F. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and the conditions under which work is to be performed and notify Owner in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 FORM CONSTRUCTION

- A. Construct forms complying with ACI 347; to the exact sizes, shapes, lines and dimensions shown; as required to obtain accurate alignment, location and grades; to tolerances specified; and to obtain level and plumb work in finish structures. Provide for openings, offsets, keyways, recesses, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes..
- B. Fabricate forms for easy removal without damaging concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
- C. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in locations as inconspicuous as possible, consistent with requirements of the work. Form intersecting planes of openings to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.
- D. Falsework:
 - 1. Erect falsework and support, brace and maintain it to safely support vertical, lateral and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct falsework so that adjustments can be made for take-up and settlement.
 - 2. Provide wedges, jacks or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce finished work of required dimensions.
- E. Forms for Exposed To View Concrete:
 - 1. Do not use metal cover plates for patching holes or defects in forms.

2. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
3. Use extra studs, walers and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material that will produce bow.
4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
5. Form molding shapes, recesses, and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.

F. Corner Treatment:

1. Form exposed corners of beams, walls, foundations, bases and columns to produce smooth, solid, unbroken lines, except as otherwise shown. Except as specified below for reentrant or internal corners, exposed corners shall be chamfered.
2. Form chamfers with 3/4-inch by 3/4-inch strips, unless otherwise shown, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Use rigid PVC chamfers for all architecturally formed concrete. Extend terminal edges to required limit and miter chamfer strips at changes in direction.
3. Reentrant or internal corners and unexposed corners may be formed either square or chamfered.

G. Joints:

1. Refer to Section 03251, Concrete Joints, for treatment of joints. Locate as shown and specified.

H. Openings and Built-In Work:

1. Provide openings in concrete formwork shown or required by other Sections or other contracts. Refer to paragraph 1.01.B herein for the requirements of coordination.
2. Accurately place and securely support items to be built into forms.

I. Cleaning and Tightening:

1. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

3.03 FORM COATINGS

- A. Coat form contact surfaces with a non-staining form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces which will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.
- B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.04 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into the formwork, anchorage devices and other embedded items, shown, specified or required by other Sections and other contracts. Refer to paragraph 1.01.B for the requirements of coordination. Use necessary setting drawings, diagrams, instructions and directions.
- B. Edge Forms and Screeds Strips for Slabs:
 - 1. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support screeds.

3.05 FIELD QUALITY CONTROL

- A. Before concrete placement, Contractor shall check the formwork, including tolerances, lines, ties, tie cones, and form coatings. He shall make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.
- B. During concrete placement Contractor shall check formwork and related supports to ensure that forms are not displaced and that completed work shall be within specified tolerances.
- C. If Contractor finds that forms are unsatisfactory in any way, either before or during placing of concrete, placement of concrete shall be postponed or stopped until the defects have been corrected, and reviewed by Owner.

3.06 REMOVAL OF FORMS

- A. Conform to the requirements of ACI 301, Chapter 4 and ACI 347, Chapter 3.7. except as specified below.
 - 1. Removal of Forms and Supports:

TEMPERATURE (°F)					
	Over 95°	70°-95°	60°-70°	50°-60°	Below 50°
a. Walls	5 days	1 day	2 days	3 days	Do not remove forms until site-cured test cylinder develops 50% of 28-day strength
b. Columns	7 days	2 days	3 days	4 days	
c. Slabs over 5 inches thick					

- B. Do not remove supporting forms or shoring until the members have acquired sufficient strength to safely support their weight and the load upon them. Results of suitable control tests may be used as evidence that the concrete has attained sufficient strength.
- C. The time for removal of all forms will be subject to Owner=s approval.

3.07 PERMANENT SHORES

- A. Provide permanent shores as defined in ACI 347 Chapter 3.7.
- B. Reshores will not be permitted.

3.08 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and latence, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces. Form surfaces shall be subject to Owner's approval.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install concrete reinforcement.
2. The extent of concrete reinforcement is shown.
3. The work includes fabrication and placement of reinforcement including bars, ties and supports, and welded wire fabric for concrete.

B. Related Sections:

CAST-IN-PLACE CONCRETE

Section 03300

1.02 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. Concrete Reinforcing Steel Institute, Manual of Standard Practice, includes ASTM standards referred to herein.
2. ACI 315, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
3. ACI 318, Building Code Requirements for Reinforced Concrete.
4. Steel Structures Painting Council, Surface Preparation Specification No. 10, Near-White Blast Cleaning.

B. Allowable Placing Tolerances: Comply with ACI 318, Chapter 7 - Details of Reinforcement except as specified below:

1. Concrete surfaces Which Are In Contact With Liquids: 2 inches minimum coverage.

1.03 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's specifications and installation instructions for all materials and reinforcement accessories.
2. Drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315, Parts A and B. For walls, show elevations to a minimum scale of 1/4-inch to 1 foot. For slabs, show top and bottom reinforcing on separate plan views. Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of

concrete reinforcement unless otherwise noted. Splices shall be kept to a minimum. Splices in regions of maximum tension stresses shall be avoided whenever possible.

- a. Drawings detailing the location of all construction and expansion joints as required under Section 03251, Concrete Joints, shall be submitted and approved before shop drawings for reinforcing steel are submitted.

B. Certificates:

1. Submit one copy of steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.

1.04 DELIVERY, HANDLING AND STORAGE

- A. Deliver concrete reinforcement materials to the site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- B. Store concrete reinforcement material at the site to prevent damage and accumulation of dirt or excessive rust. Store on heavy wood blocking so that no part of it will come in contact with the ground.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars: ASTM A 615, and as follows:

1. Provide Grade 60 for all bars except for stirrups and ties which shall be Grade 40.
2. Bars noted on plans to be epoxy-coated, shall be coated with Scotchkote Brand Fusion Bonded Epoxy Coating 213 or 214 as manufactured by 3M, St. Paul, Minnesota, or equal. Coating shall be applied to cleaned steel reinforcing bars by the electrostatic spray method and fully cured in accordance with the recommendations of the manufacturer of the coating material. Before coating, the bars shall be cleaned by abrasive blast cleaning to meet the requirements of near white metal in accordance with SSPC-SP10. The coating shall be applied to the cleaned surface as soon as possible after cleaning, and before oxidation of the surface discernable to the unaided eye occurs. However, in no case shall application of the coating be delayed more than 8 hours after cleaning. The film thickness of the coating after curing shall be 5 to 20 mils, inclusive, as measured using ASTM G 12 on the body of the reinforcing bar between the deformation and/or ribs on a straight length of bar. The coating shall be free from holes, voids, cracks, and damaged areas discernible to the unaided eye. Damaged or other unsatisfactory areas shall be patched with a coating material and by a method recommended by the coating manufacturer.

B. Steel Wire: ASTM A82.

C. Welded Smooth Wire Fabric: ASTM A185.

1. Furnish in flat sheets, not rolls.

- D Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.
1. Use wire bar type supports complying with CRSI recommendations, except as specified below. Do not use wood, brick, or other unacceptable materials.
 2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 3. For all concrete surfaces, where legs of supports are in contact with forms, provide supports complying with CRSI "Manual of Standard Practice" as follows:
 - a. Either hot-dip galvanized, plastic protected or stainless steel legs.

2.02 FABRICATION

- A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI, Manual of Standard Practice. In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:
1. Bar lengths, bends, and other dimensions exceeding specified fabrication tolerances.
 2. Bends or kinks not shown on approved shop drawings.
 3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and the conditions under which concrete reinforcement is to be placed, and notify Owner in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 INSTALLATION

- A. Comply with the applicable recommendations of specified codes and standards, and CRSI, Manual of Standard Practice, for details and methods of reinforcement placement and supports.
- B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement against displacement during formwork construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
1. Place reinforcement to obtain the minimum concrete coverages as shown and as specified in ACI 318. Arrange, space, and securely tie bars and bar supports

together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

2. Prior to placement of concrete, Contractor shall demonstrate to Owner that the specified cover of reinforcement has been attained, by using a surveying level or string line.
 3. Reinforcing steel shall not be secured to forms with wire, nails or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.
- D. Install welded wire fabric in as long lengths as practical. Lap adjoining pieces at least one full mesh and lace splices with 16 gage wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.
- E. Provide sufficient numbers of supports of strength required to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- F. Splices:
1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars.

3.03 INSPECTION OF REINFORCEMENT

- A. Concrete shall not be placed until the reinforcing steel is inspected and permission for placing concrete is granted by Owner. All concrete placed in violation of this provision will be rejected.

END OF SECTION

SECTION 03251
CONCRETE JOINTS

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install concrete joints.
2. The types of concrete joints required include the following:
 - a. Construction joints.
 - b. Expansion joints and fillers.
 - c. Waterstops.
 - d. Control joints.

B. General: All joints subject to hydrostatic pressure shall be provided with continuous waterstop.

C. Related Sections:

CONCRETE FORMWORK	Section 03100
CAST-IN-PLACE CONCRETE	Section 03300
CAULKING AND SEALANTS	Section 07920

1.02 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

1. ACI 301, Specifications for Structural Concrete for Buildings, Chapter 6, Joints and Embedded Items.
2. ASTM A 36, Standard Specification for Structural Steel.
3. ASTM D 1752, Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
4. CRD-C572, Corps of Engineers Specifications for Polyvinyl- Chloride Waterstop.

B. All manufactured items shall be installed in accordance with manufacturer's instructions.

1.03 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Manufacturer's specifications and installation instructions for all materials required.

2. Layout of all construction joint locations prior to the submittal of steel reinforcing drawings.
- B. Samples: Submit for approval the following:
1. Polyvinyl chloride waterstops for joints.
 2. Cork expansion joint fillers.

PART 2 PRODUCTS

2.01 WATERSTOPS

- A. Polyvinyl Chloride:
1. Reference Standard: CRD-C572.
 2. Construction Joints: Minimum of 3/8-inch thick.
 - a. Width shall be as shown, or if not shown, as recommended by the manufacturer.
 3. Expansion Joints: Uniform minimum thickness of 1/4 inch by 9 inches minimum width. Center bulb shall be O- or U-shaped. The "O" shall have an outside diameter of 3/4-inch minimum. The top of the "U" shall be jointed by a membrane which will tear when the expansion occurs.
 4. Manufacturer: Provide polyvinyl chloride waterstops of one of the following:
 - a. W.R. Meadows, Incorporated.
 - b. A.C. Horn, Incorporated.
 - c. Or equal.

2.02 PREFORMED EXPANSION JOINT FILLER

- A. Provide preformed expansion joint filler complying with ASTM D 1752, Type II, cork.

2.03 CONCRETE CONSTRUCTION JOINT ROUGHENER

- A. Provide a water soluble non-flammable, surface-retardant roughener.
- B. Product and Manufacturer: Provide one of the following:
1. Rugasol-S, as manufactured by Sika Corporation for horizontal joints only.
 2. Or equal.

2.04 EPOXY BONDING AGENT

- A. Provide an epoxy-resin bonding agent, two component type.
- B. Product and Manufacturer: Provide one of the following:

1. Sikadur 32 Hi-Mod LPL, as manufactured by Sika Corporation.
2. Or equal.

2.05 NEOPRENE BEARING PADS

A. Product and Manufacturer: Provide one of the following:

1. 65 Durometer, Sheet Neoprene No. 1200, as manufactured by Williams Products Company.
2. Or equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and the conditions under which work is to be performed and notify Owner in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 CONSTRUCTION JOINTS

- A. Comply with ACI 301, Chapter 6, and as specified below.

- B. Locate and install construction joints as shown. Additional construction joints shall be located as follows:

1. In walls locate joints at a spacing of 40 feet maximum and approximately 12 feet from corners.
2. In foundation slabs and slabs on grade locate joints at a spacing of approximately 40 feet. Place concrete in a strip pattern.
3. In mats and structural slabs and beams, at a spacing of approximately 40 feet. Locate joints in compliance with ACI 301, Chapter 6.
4. Provide other additional construction joints as required to satisfactorily complete all work.

C. Horizontal Joints:

1. Roughen concrete at the interface of construction joints by sandblasting to expose the aggregate and remove accumulated concrete on rebar immediately subsequent to form stripping unless otherwise approved by Owner. Immediately before placing fresh concrete, thoroughly clean the existing contact surface using a stiff brush or other tools and a stream of water under pressure. The surface shall be clean and wet, but free from pools of water at the moment the fresh concrete is placed.
2. Remove laitance, waste mortar or other substance which may prevent complete adhesion.

3. Place a 2-inch thick coat of mortar, of similar proportions to the mortar in the concrete, over the contact surface of the old concrete. Place fresh concrete before the mortar has attained its initial set.

D. Vertical Joints:

1. Apply roughener to the form in a thin, even film by brush, spray or roller in accordance with the manufacturer's instructions. After roughener is dry, concrete may be placed.
2. When concrete has been placed and the form removed, wash loosened material off with high pressure water spray to obtain roughened surface subject to approval by Owner.

3.03 EXPANSION JOINTS

- A. Comply with ACI 301, Chapter 6, and as specified below.
- B. Locate and install expansion joints as shown. Install cork filler in accordance with manufacturer's instructions. Caulking and sealants shall be installed as specified in Section 07920, Caulking and Sealants.

3.04 WATERSTOPS

A. General:

1. Comply with ACI 301, Chapter 6, and as specified below. All joints shall be made in accordance with manufacturer's instructions.
2. Obtain Owner's approval for waterstop locations not shown.
3. Provide waterstops in all foundations, tanks and other substructures up to an elevation at least 12 inches above grade or to an elevation at least 12 inches above liquid level in tanks, whichever is higher, except where otherwise shown or noted.

B. Polyvinyl Chloride Waterstop:

1. Tie waterstop to reinforcement so that it is securely and rigidly supported in the proper position during concrete placement. Continuously inspect waterstops during concrete placement to insure their proper positioning.
2. Waterstops shall be fused using equipment as supplied by or recommended by the manufacturer.

3.05 BONDING WITH EPOXY ADHESIVE

A. Use adhesive for the following:

1. Bonding of fresh concrete to concrete cured at least 45 days or to existing concrete.
2. Bonding of horizontal surfaces which will receive a topping.
3. Bonding of horizontal construction joints where these are required by the Drawings or approved by Owner for foundation mats that are 5 feet thick or greater.

- B. Handle and store epoxy adhesive in compliance with the manufacturer's printed instructions, including safety precautions.
- C. Mix the epoxy adhesive in complete accordance with the instructions of the manufacturer.
- D. Before placing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with epoxy grout not less than 1/16-inch thick. Place fresh concrete while the epoxy material is still tacky, without removing the in-place grout coat, and as directed by the epoxy manufacturer.

END OF SECTION

SECTION 03252
CONCRETE ANCHORS

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install anchor bolts, expansion anchors and concrete inserts.

B. This section includes all bolts, anchors and inserts required for the work but not specified under other sections.

C. The types of work using concrete anchors includes but is not limited to the following:

1. Hangers and brackets.
2. Equipment.
3. Piping.
4. Tanks.
5. Grating and floor plate.
6. Electrical and HVAC work.
7. Wood and plastic fabrications.
8. Partitions and ceilings.
9. Shelf angles and masonry lintels.

D. Related Sections:

MISCELLANEOUS FABRICATIONS
SUPPORTS AND ANCHORS

Section 05500
Section 15140

1.02 QUALITY ASSURANCE

A. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown and specified.

1. ASTM A 123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A 153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

4. ASTM A 484, Standard Specification for General Requirements for Stainless and Heat-Resisting Steel Bars, Billets and Forgings.
 5. ASTM A 536, Standard Specification for Ductile Iron Castings.
 6. ASTM A 570, Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
 7. Federal Specification FF-S-325 for Concrete Expansion Anchors.
 8. Federal Specifications WW-H-171E for Malleable Iron.
- B. Expansion anchors and inserts shall be UL or FM approved.

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
1. Setting drawings and templates for location and installation of anchorage devices.
 2. Copies of manufacturer's specifications, load tables, dimension diagrams and installation instructions for the devices.
- B. Samples: Submit for approval the following:
1. Representative samples of bolts, anchors and inserts as may be requested by Owner. Review will be for type and finish only. Compliance with all other requirements is exclusive responsibility of Contractor.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

- A. When the size, length or load carrying capacity of an anchor bolt, expansion anchor or concrete insert is not shown, provide the size, length and capacity required to carry the design load times a minimum safety factor of four.
- B. Determine design loads as follows:
1. For equipment anchors, use the design load recommended by the manufacturer and approved by Owner.
 2. For pipe hangers and supports, use one half the total weight of pipe, fittings, valves, accessories and water contained in pipe, between the hanger or support in question and adjacent hangers and supports on both sides.
 3. Allowances for vibration are included in the safety factor specified above.
 4. Anchors shall develop ultimate shear and pull-out loads of not less than the following values in concrete:

<u>Bolt Diameter (Inches)</u>	<u>Min Shear (Pounds)</u>	<u>Min Pull-Out Load (Pounds)</u>
1/2	4,500	6,300
5/8	6,900	7,700
3/4	10,500	9,900

2.02 MATERIALS

A. Anchor Bolts:

1. Provide hot-dip galvanized bolts complying with ASTM A 307, non-headed type unless otherwise indicated.
2. In buried or submerged locations, provide stainless steel bolts complete with nuts and washers complying with ASTM A 320, AISI Type 316. Other AISI types may be used subject to Owner's approval.
3. For equipment provide anchor bolts which meet the equipment manufacturer's recommendations for size, material, and strength.
4. Provide anchor bolts as shown or as required to secure structural steel to concrete or masonry.
5. Locate and accurately set the anchor bolts using templates or other devices as necessary.
6. Protect threads and shank from damage during installation of equipment and structural steel.
7. Comply with required embedment length and necessary anchor bolt projection.

B. Drop-In Expansion Anchors:

1. Provide carbon steel drop-in expansion anchors zinc plated in accordance with ASTM B 633.
2. Drop-in expansion anchors shall be of the size required for the concrete strength specified and the loads required.
3. Product and Manufacturer: Provide one of the following:
 - a. HDI Drop-In Anchor, as manufactured by Hilti, Incorporated.
 - b. Or equal.

C. Wedge Expansion Anchors:

1. Provide carbon steel wedge anchors, nuts and washers, zinc plated in accordance with ASTM B 633, and meet the requirements of Federal Specification FF-S-325, Group II, Type 4, Class 1.
2. Product and Manufacturer: Provide one of the following:
 - a. Hilti Kwik Bolt II, as manufactured by Hilti, Incorporated.

- b. Or equal.

D. Adhesive Anchors:

1. Provide carbon steel anchors complying with ASTM A 307, non headed type unless otherwise indicated.
2. Anchors shall be of the size required for the concrete strength specified.
3. Anchors shall utilize epoxy resin or vinylester resin.
 - a. Provide system utilizing a glass vial that contain both resin and hardening agent for fastening to concrete or any similar solid base material. The installed system shall achieve minimum strength requirements recommended by the following manufacturer:
 1. HVA Adhesive System, as manufactured by Hilti, Incorporated.
 2. Or equal.
 - b. Provide system utilizing a screen tube with a cartridge dispenser which contains two parallel tubes of resin and hardener for fastening to brick, concrete block or any similar hollow base material. The installed system shall achieve minimum strength requirements recommended by the following manufacturer:
 1. HIT C-20 Adhesive Anchors, as manufactured by Hilti, Incorporated.
 2. Or equal.

E. Concrete Inserts:

1. For piping, grating, floor plate and masonry lintels, provide malleable iron inserts. Comply with Federal Specification WW-H-171E (Type 18). Provide those recommended by the manufacturer for the required loading.
2. Finish shall be black.
3. Product and Manufacturer: Provide one of the following:
 - a. Figure 282, as manufactured by ITT Grinnell.
 - b. Or equal.

- F. Powder actuated fasteners and other types of bolts and fasteners not specified herein shall not be used unless approved by Owner.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor shall examine areas and conditions under which anchor bolts, expansion anchors and concrete insert work is to be installed, and notify Owner in writing of conditions

detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 INSTALLATION

- A. Drilling equipment used and installation of expansion anchors shall be in accordance with manufacturer's instructions.
- B. Assure that embedded items are protected from damage and are not filled in with concrete.
- C. Expansion anchors may be used for hanging or supporting pipe 2 inches diameter and smaller. Expansion anchors shall not be used for larger pipe unless otherwise shown or approved by Owner.
- D. Use concrete inserts for pipe hangers and supports for the pipe size and loading recommended by the insert manufacturer.
- E. Unless otherwise shown or approved by Owner conform to following for expansion anchors:
 - 1. Minimum embedment depth in concrete: 5 diameters.
 - 2. Minimum anchor spacing on centers: 10 diameters.
 - 3. Minimum distance to edge of concrete: 5 diameters.
 - 4. Increase dimensions above if required to develop the required anchor load capacity.
- F. For the adhesive anchors and adhesive material, Contractor shall comply with the manufacturer's installation instructions on the hole diameter and depth required to fully develop the tensile strength of the anchor or reinforcing bar. Contractor shall properly clean out the hole utilizing a wire brush and compressed air to remove all loose material from the hole, prior to installing adhesive capsules or material.
- G. Adhesive anchor manufacturer's representative shall observe and demonstrate the proper installation procedures for the adhesive anchors and adhesive material at no additional expense to Owner. Each installer shall be certified in writing by the manufacturer to be qualified to install the adhesive anchors.

3.03 CLEANING

- A. After embedding concrete is placed, remove protection and clean bolts and inserts.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install cast-in-place concrete.
2. The work includes providing concrete consisting of Portland cement, fine and coarse aggregate, water, and approved admixtures; combined, mixed, transported, placed, finished and cured.

B. Coordination:

1. Review installation procedures under other sections and coordinate the installation of items that must be installed in the concrete.

C. Classes of Concrete:

1. Class "A" concrete shall be steel reinforced and includes the following:
 - a. Foundations.
2. Class "E" concrete shall be placed in accordance with Section 02524, and includes the following:
 - a. Concrete curbs.

D. Related Sections:

CONCRETE CURBS	Section 02524
CONCRETE FORMWORK	Section 03100
CONCRETE REINFORCEMENT	Section 03200

1.02 QUALITY ASSURANCE

A. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ACI 301, Specifications for Structural Concrete for Buildings.
2. ACI 304, Guide for Measuring, Mixing, Transporting and Placing Concrete.
3. ACI 306, Cold Weather Concreting.
4. ACI 318, Building Code Requirements for Reinforced Concrete.
5. AASHTO M 182, Burlap Cloth Made From Jute or Kenaf.

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
1. Manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures and bonding agents.
 2. List of concrete materials and concrete mix designs proposed for use. Include the results of all tests performed to qualify the materials and to establish the mix designs.
 3. The following information, if ready-mixed concrete is used.
 - a. Physical capacity of mixing plant.
 - b. Trucking facilities available.
 - c. Estimated average amount which can be produced and delivered to the site during a normal 8 hour day, excluding the output to other customers.
- B. Laboratory Test Reports: Submit copies of laboratory test reports for concrete cylinders, materials and mix design tests. Owner's review will be for general information only. Production of concrete to comply with specified requirements is the responsibility of Contractor.
- C. Delivery Tickets: Furnish to Owner copies of all delivery tickets for each load of concrete delivered to the site. Provide items of information as specified in ASTM C 94, Section 16.
1. Provide batch tickets for each batch of job-site mixed concrete, as specified.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All materials used for concrete must be kept clean and free from all foreign matter during transportation and handling and kept separate until measured and placed in the mixer. Bins or platforms having hard clean surfaces shall be provided for storage. Suitable means shall be taken during hauling, piling and handling to insure that segregation of the coarse and fine aggregate particles does not occur and the grading is not affected.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. The materials listed in the approved mix designs, which meet the requirements listed herein and which were verified by the trial batch testing, shall not be changed in type or source unless a revised mix design and accompanying trial batch verification has been accepted by the owner.
- B. Cement:
1. Portland cement, ASTM C 150, Type II; or blended hydraulic cement, ASTM C 595, Type 1P (MS). Type I may be used in lieu of Type II when acceptable to Owner.
 2. Use Portland cement made by a well-known acceptable manufacturer and produced by not more than one plant.

3. Do not use cement which has deteriorated because of improper storage or handling.
- C. Aggregates: ASTM C 33 and as herein specified.
1. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
 - a. Dune sand, bank run sand and manufactured sand are not acceptable.
 3. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone.
 - b. Washed gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
 - c. Coarse Aggregate Size: Size to be ASTM C 33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16 inches or greater in thickness.
- D. Water: Clean, free from injurious amounts of oils, acids, alkalis, organic materials or other substances that may be deleterious to concrete or steel.

2. 02 CONCRETE ADMIXTURES

- A. Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instruction. Do not use admixtures which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by Owner.
- B. Air-Entraining Admixtures: ASTM C 260.
1. Product and Manufacturer: Provide one of the following:
 - a. MB-VR, as manufactured by Master Builders Inc.
 - b. Or equal.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
1. Proportion all Class "A" and Class "B" concrete with non-air entraining, normal setting, water-reducing, aqueous solution of a modification of the salt of polyhydroxylated organic acids. The admixture shall not contain any lignin, nitrates or chlorides added during manufacture.
 2. Product and Manufacturer: Provide one of the following:
 - a. Pozzolith, as manufactured by Master Builders Inc.
 - b. Or equal.

- D. Set-Control Admixtures: ASTM C 494, as follows:
1. Type B, Retarding.
 2. Type C, Accelerating.
 3. Type D, Water-reducing and Retarding.
 4. Type E, Water-reducing and Accelerating.
- E. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by Owner. Do not use admixtures containing calcium chloride where concrete is placed against galvanized steel.

2.03 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes of concrete. Mixes subject to the following limitations:

1. Structural Concrete (Class "A"):

- a. Specified 28-day Compressive Strength: 4,000 psi.
- b. Maximum Water-Cement Ratio by Weight: 0.45.

<u>Coarse Aggregate Number</u>	<u>Minimum Cement Content-Pounds Per Cubic Yard</u>	<u>Percent Air Content</u>
57, 67	564	6 ± 1%
467	517	5 ± 1%

2. Structural Concrete (Class "E"):

- a. Specified 28-day Compressive Strength: 5,000 psi.
- b. Maximum Water-Cement Ratio by Weight: 0.40.

<u>Coarse Aggregate Number</u>	<u>Minimum Cement Content-Pounds Per Cubic Yard</u>	<u>Percent Air Content</u>
57	600	6 ± 1%

- B. Use an independent testing facility acceptable to Owner for preparing and reporting proposed mix designs.
1. The testing facility shall not be the same as used for field quality control testing.
- C. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for concrete required. Comply with ACI 301 Chapter 3 and report to Owner the following data:
1. Complete identification of aggregate source of supply.
 2. Tests of aggregates for compliance with specified requirements.
 3. Scale weight of each aggregate.

4. Absorbed water in each aggregate.
 5. Brand, type and composition of cement.
 6. Brand, type and amount of each admixture.
 7. Amounts of water used in trial mixes.
 8. Proportions of each material per cubic yard.
 9. Gross weight and yield per cubic yard of trial mixtures.
 10. Measured slump.
 11. Measured air content.
 12. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7-day and 28-day test, and for each design mix.
- D. Submit written reports to Owner of proposed mix of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been approved by Owner.
- E. Laboratory Trial Batches: When laboratory trial batches are used to select concrete proportions, prepare test specimens and conduct strength tests as specified in ACI 301, Chapter 3 - Proportioning. Concrete mixes shall be designed to produce laboratory trial mix compressive strength in excess of 120 percent of the specified compressive strength regardless of the production facilities standard deviation.
- F. Field Experience Method: When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 301, Chapter 3.
- G. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner and as accepted by Owner. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by Owner before using the revised mixes.
- H. Admixtures:
1. Use air-entraining admixture in all concrete, except interior slabs subject to abrasion, unless otherwise shown or specified. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the prescribed limits.
 2. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities and types of admixtures as required to maintain quality control.
- I. Slump Limits: Proportion and design mixes to result in concrete slump at the point of placement of not less than 2. 5 inch and not more than 4. 5 inches.

2. 04 CONCRETE CURING MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 10 ounces per square yard and complying with AASHTO M182, Class 3.

B. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

1. Waterproof paper.
2. Polyethylene film.
3. White burlap-polyethylene sheet.

C. Curing Compound: ASTM C 309 Type 1-D (water retention requirements):

1. Product and Manufacturer: Provide one of the following:
 - a. MasterKure, as manufactured by Master Builders, Inc.
 - b. Or equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and the conditions under which work is to be performed and notify Owner in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 CONCRETE MIXING

A. General:

1. Concrete may be produced at batch plants or it may be produced by the ready-mixed process. Batch plants shall comply with the recommendations of ACI 304, and shall have sufficient capacity to produce concrete of the qualities specified, in quantities required to meet the construction schedule. All plant facilities are subject to testing laboratory inspection and acceptance of Owner.
2. Mixing:
 - a. Mix concrete with an approved rotating type batch machine, except where hand mixing of very small quantities may be permitted.
 - b. Remove hardened accumulations of cement and concrete frequently from drum and blades to assure acceptable mixing action.
 - c. Replace mixer blades when they have lost 10 percent of their original height.
 - d. Use quantities such that a whole number of bags of cement is required, unless otherwise permitted.

- B. Job Site Mixing: When job site mixing of concrete is permitted, mix all materials for concrete in an acceptable drum type batch machine mixer. For mixers of one cubic yard, or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after all ingredients are in the mixer, before any part of the batch is released. For mixers of capacity larger than one cubic yard, increase the minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cubic yard, or fraction thereof. Do not exceed the catalog

rating or nameplate capacity for the total volume of materials used per batch. Equip the mixer with automatic controls, or semi-automatic controls if acceptable, for proportioning materials and the proper measured quantities. Do not exceed 45 minutes total elapsed time between intermingling of damp aggregates and cement to the discharge of the completed mix.

C. Ready-Mix Concrete:

1. Comply with the requirements of ASTM C 94, and as herein specified. Proposed changes in mixing procedures, other than herein specified, must be accepted by Owner before implementation.
 - a. Plant equipment and facilities: Conform to National Ready- Mix Concrete Association "Plant and Delivery Equipment Specification".
 - b. Mix concrete in revolving type truck mixers which are in good condition and which produce thoroughly mixed concrete of the specified consistency and strength.
 - c. Do not exceed the proper capacity of the mixer.
 - d. Mix concrete for a minimum of two minutes after arrival at the job site, or as recommended by the mixer manufacturer.
 - e. While in transit, the drum shall turn only at agitating speed.
 - f. Mix at proper speed until concrete is discharged.
 - g. Maintain adequate facilities at the job site for continuous delivery of concrete at the required rates.
 - h. Provide access to the mixing plant for Owner at all times.
 - i. Provide a batch ticket for each batch discharged and used in the work, indicating the project identification name and number, date, mix type, mix time, quantity and amount of water introduced.

- C. Maintain equipment in proper operating condition, with drums cleaned before charging each batch. Schedule rates of delivery in order to prevent delay of placing the concrete after mixing, or holding dry- mixed materials too long in the mixer before the addition of water and admixtures.

3. 03 TRANSPORTING CONCRETE

- A. Transport and place concrete not more than 90 minutes after water has been added to the dry ingredients.
- B. Take care to avoid spilling and separation of the mixture during transportation.
- C. Do not place concrete in which the ingredients have been separated.
- D. Do not retemper partially set concrete.
- E. Use suitable and approved equipment for transporting concrete from mixer to forms.

3.04 CONCRETE PLACEMENT

- A. General: Place concrete continuously so that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints. Deposit concrete as nearly as practical in its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation.
1. Screed concrete which is to receive other construction to the proper level to avoid excessive skimming or grouting.
 2. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. Do not use rettempered concrete. Remove rejected concrete from the job site and dispose of it in an acceptable location.
 3. Do not place concrete until all forms, bracing, reinforcement, are in final and secure position.
 4. Do not place footings in freezing weather unless adequate precautions are taken against frost action.
 5. Do not place footings on frozen soil.
 6. Unless otherwise approved, place concrete only when Owner is present.
- B. Concrete Conveying:
1. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practical by methods which will prevent segregation and loss of concrete mix materials.
 2. Provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice and other deleterious materials.
 3. Do not use chutes for distributing concrete unless approved in writing by Owner.
 - a. Provide sketches showing methods by which chutes will be employed when requesting such approval.
 - b. Design chutes, if permitted, with proper slopes and supports to permit efficient handling of the concrete.
 4. Pumping concrete is permitted, however do not use aluminum pipe for conveying.
- C. Placing Concrete into Forms:
1. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place concrete at such a rate that concrete which is being integrated with fresh concrete is still plastic.

2. Do not permit concrete to free fall within the form from a distance exceeding 4 feet. Use "elephant trunks" to prevent free fall and excessive splashing on forms and reinforcement.
3. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
4. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with the applicable recommended practices of ACI 309. Vibration of forms and reinforcing will not be permitted, unless otherwise accepted by Owner.
5. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.

D. Quality of Concrete Work:

1. Make all concrete solid, compact and smooth, and free of laitance, cracks and cold joints.
2. All concrete in contact with earth, water, or exposed directly to the elements shall be watertight.
3. Cut out and properly replace to the extent ordered by Owner, or repair to the satisfaction of Owner, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Thin patches or plastering will not be acceptable.
4. All leaks through concrete, and cracks, holes or other defective concrete in areas of potential leakage, shall be repaired and made watertight by Contractor.
5. Repair, removal, and replacement of defective concrete as ordered by Owner shall be at no additional cost to Owner.

E. Cold Weather Placing:

1. Protect all concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.
2. When the air temperature has fallen to or may be expected to fall below 40 degrees F, provide adequate means to maintain the temperature, in the area where concrete is being placed, at between 50 and 70 degrees F for at least seven days after placing. Provide temporary housings or coverings including tarpaulins or plastic film. Maintain the heat and protection, if necessary, to insure that the ambient temperature does not fall more than 30 degrees F in the 24 hours following the 7-day period. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating.

3. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 55 degrees F and not more than 85 degrees F at point of placement.
4. Do not use frozen materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.
5. Do not use salt and other materials containing antifreeze agents or chemical accelerators, or set-control admixtures, unless approved by Owner, in mix designs.

3.05 FINISH OF FORMED SURFACES

A. Rough Form Finish:

1. Standard rough form finish shall be the concrete surface having the texture imparted by the form material used, with tie holes and defective areas repaired and patched with mortar of 1 part cement to 1 2 parts sand and all fins and other projections exceeding 1/4-inch in height rubbed down or chipped off.
2. Use rough form finish for the following:
 - a. Exterior surfaces to faced with stonework.

3.06 FINISHES

A. Float Finish:

1. After placing concrete, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. Check and level the surface plane to a tolerance not exceeding 1/4 inch in 10 feet when tested with a 10-foot straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to sides. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture.

B. Non-Slip Broom Finish (Sidewalk):

1. Immediately after float finishing, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. Use fiber-bristle broom unless otherwise directed. Coordinate the required final finish with Owner before application.

3.07 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete.

2. Start initial curing after placing and finishing concrete as soon as free moisture has disappeared from the concrete surface. Keep continuously moist for not less than 72 hours.
3. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. For concrete sections over 30 inches thick, continue final curing for an additional 7 days, minimum. Avoid rapid drying at the end of the final curing period.

B. Curing Methods:

1. Perform curing of concrete by moist curing, or by moisture- retaining cover curing. Use curing compound only in cold weather and only when permitted by Owner.
 - a. For curing, use water that is free of impurities which could etch or discolor exposed, natural concrete surfaces.
2. Provide moisture curing by any of the following methods:
 - a. Keeping the surface of the concrete continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering the concrete surface with the specified absorptive cover, thoroughly saturating the cover with water, and keeping the absorptive cover continuously wet with sprinklers or porous hoses. Place absorptive cover so as to provide coverage of the concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.

C. Temperature of Concrete During Curing:

1. When the atmospheric temperature is 40 degrees F and below, maintain the concrete temperature between 50 and 70 degrees F continuously throughout the curing period. When necessary, make arrangement before concrete placing for heating, covering, insulation or housing as required to maintain the specified temperature and moisture conditions continuously for the concrete curing period. Provide cold weather protection complying with the requirements of ACI 306.
2. Maintain concrete temperature as uniformly as possible, and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete which exceed 5 degrees F in any 1 hour and 50 degrees F in any 24-hour period.

END OF SECTION

SECTION 03600

GROUT

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified and required to furnish and install grout.
2. Grout shall be placed at the following locations:
 - a. Equipment bases.
 - b. Handrails and railings.
 - d. Foundation grouting.
 - e. Construction joints.
3. The types of grout include the following:
 - a. Non-shrink, epoxy type.
 - b. Non-shrink, non-metallic type.
 - c. Ordinary cement-sand.

B. Cement Type Grout:

1. Cement type grout shall have a compression strength of 4000 PSI and include the following:
 - a. Foundation grout.
 - b. Construction joint grout.
 - c. Masonry lintels, bond beams, and pilasters grout fill.

C. Related Sections:

CONCRETE JOINTS	Section 03251
CAST-IN-PLACE CONCRETE	Section 03300
MORTAR	Section 04100

1.02 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM C 144, Standard Specification for Aggregate for Masonry Mortar.
2. ASTM C 150, Standard Specification for Portland Cement.

3. ASTM C 109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2-in. or 50 mm. Cube Specimens).
4. CRD-C-619, Specification for Grout Fluidifier.
5. CRD-C-621, Specification for Non-Shrink Grout.

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
1. Manufacturer's specifications and installation instructions for all proprietary materials.
 2. For ordinary cement grout, copies of grout design mix and laboratory test reports for grout strength tests.
- B. Reports and Certificates:
1. For proprietary materials, submit copies of reports on quality control tests.
 2. Submit certification that materials meet specification requirements for nonproprietary materials.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Grout materials from manufacturers shall be delivered in unopened containers and shall bear intact manufacturer's labels.
- B. Storage of Materials: Grout materials shall be stored in a dry shelter and shall be protected from moisture.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Non-Shrink, Epoxy Grout:
1. Use prepackaged, solvent-free, moisture insensitive, non-staining cementitious grout requiring only the addition of water at the job site.
 2. Product and Manufacturer: Provide one of the following:
 - a. Sikadur 32-Hi-Mod Grout, as manufactured by Sika Corporation.
 - b. Or equal.
- B. Non-Shrink, Nonmetallic Grout:
1. Prepackaged non-staining cementitious grout which shall meet the minimum requirements of CRD C-621 and requiring only the addition of water at the jobsite.
 2. Product and Manufacturer: Provide one of the following:
 - a. Masterflow 713, as manufactured by Master Builders, Incorporated.

- b. Or equal.
- C. Ordinary Cement-Sand Grout: Prepare design mixes of ordinary cement grout. Mixes subject to the following limitations:
 - 1. Cement:
 - a. Portland cement, ASTM C150, Type II; or blended hydraulic cement, ASTM C595, Type 1P.
 - 2. Aggregates: ASTM C33 and as herein specified.
 - a. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 - b. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances.
 - 1. Dune sand, bank run sand and manufactured sand are not acceptable.
 - 3. Admixtures: Provide admixtures produced by established reputable manufacturers, and use in compliance with the manufacturer's printed instruction. Do not use admixtures, which have not been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by Owner. Refer to Section 03300, Cast-In-Place Concrete for additional admixtures requirements.
 - 4. Proportioning and Design of Mixes: Prepare design mixes subject to the following limitations:
 - a. Specified 28-day Compressive Strength: 4,000 psi.
 - b. Maximum Water-Cement Ratio by Weight: 0.45.
 - c. Fine Aggregate meeting ASTM C33.
 - d. Air Content Percentage: 9±1%.
 - e. Minimum Cement Content in Pounds per Cubic Yard: 658.
 - 5. Slump Limits: Proportion and design mixes to result in grout slump at the point of placement of not more than 5 inches.
 - 6. Water: Use clean, fresh, potable water free from injurious amounts of oils, acids, alkalies or organic matter.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and conditions under which grout is to be placed, and notify Owner in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 INSTALLATION

A. General:

1. Place grout as shown and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Specifications do not proceed until Owner provides clarification.
2. Drypacking will not be permitted.
3. Manufacturers of proprietary products shall make available upon 72 hours notification the services of a qualified, full time employee to aid in assuring proper use of the product under job conditions.
4. Placing grout shall conform to temperature and weather limitations in Section 03300, Cast-In-Place Concrete.

B. Columns, Beams and Equipment Bases:

1. After shimming columns, beams and equipment to proper grade, securely tighten anchor bolts. Properly form around the base plates allowing sufficient room around the edges for placing the grout. Adequate depth between the bottom of the base plate and the top of concrete base must be provided to assure that the void is completely filled with the non-shrink, non-metallic grout.

C. Handrails and Railings:

1. After posts have been properly inserted into the holes or sleeves, fill the annular space between posts and sleeve with the non-shrink, non-metallic grout. Bevel grout at juncture with post so that moisture flows away from post.

D. Construction Joints:

1. Place a 2-inch thick coat of ordinary cement grout over the contact surface of the old concrete at the interface of horizontal construction joints as outlined in Sections 03251, Concrete Joints, and 03300, Cast-In-Place Concrete.

E. Grout Fill Around Reinforcement in Masonry Work:

1. Provide ordinary cement grout for grout fill in masonry lintels, bond beams, and pilasters. Use of water-reducing admixture not required.

F. Reinforcing Bar Dowels:

1. Preparation:
 - a. The concrete corings shall be cleaned of all similar contamination and debris, chipping and roughening the surface if any laitance or poor concrete is in evidence. Special care shall be taken with the grout in hot or cold weather to insure proper setting and gain of strength. Aggravating conditions of placement are to be alleviated to an extent that the temperature of the grout up until time of set will be about the range of 60° to 80°F. Ice or hot water may be used and shields from the sun and hot winds shall be provided when required. Following cleaning, the concrete shall be water saturated for a period of six hours, the excess water then removed from the surface.

2. Grouting:

- a. After the dowels have been properly inserted into the corings, non-shrink epoxy grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped. Whenever practical, grout shall be poured from one side only and thence flow across to the open side to avoid air entrapment.

END OF SECTION

SECTION 04100

MORTAR

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all mortar work.
2. This section specifies the mortar for masonry materials specified in the following:
 - a. Section 04220, Concrete Unit Masonry.

B. Related Sections:

GROUT	Section 03600
UNIT MASONRY CONSTRUCTION	Section 04201

1.02 QUALITY ASSURANCE

- A. Codes: Comply with the applicable requirements of New York State Uniform Fire Prevention and Building Code for types of mortar work specified.

B. Source Quality Control:

1. Do not change source or brands of mortar materials during the course of the work.
2. Where question of compliance to the requirements of this Section arise the mortar properties specification shall take precedence over the mortar proportion specifications.
3. No change shall be made in the proportions established for mortar accepted under the property specifications nor shall materials with different physical characteristics be utilized in mortar used in the work unless compliance with the requirements of the property specifications is re-established by shop drawing data submission to Owner.
4. Two air-entraining materials shall not be combined in mortar.

- C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM C 5, Quicklime for Structural Purposes.
2. ASTM C 91, Masonry Cement.
3. ASTM C 136, Sieve or Screen Analysis of Fine and Coarse Aggregates.
4. ASTM C 144, Aggregate for Masonry Mortar.
5. ASTM C 150, Portland Cement.

6. ASTM C 207, Hydrated Lime for Masonry Purposes.
7. ASTM C 270, Mortar for Unit Masonry.
8. ASTM C 404, Aggregates for Masonry Grouts.
9. ASTM C 476, Grout for Masonry.

1.03 SUBMITTALS

- A. Samples: Submit for approval samples of each type of colored mortar, showing the range of color which can be expected in the work. Label samples to indicate type and amount of colorant used. Owner's review will be for color only. Compliance with all other requirements is the exclusive responsibility of Contractor.
- B. Shop Drawings: Submit for approval, copies of manufacturer's specifications and instructions for each manufactured product.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Manufactured materials, such as cement and lime, shall be delivered and stored in their original containers, plainly marked with identification of materials and manufacturer.
- B. Storage of Materials:
 1. Store mortar materials off the ground in a dry location and under a properly constructed shelter using tarpaulins, felt paper, or polyethylene sheets.
 2. Protect liquid admixtures from freezing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement: Provide the following for Portland cement-lime mortars:
 1. ASTM C 150, Type I.
 2. Use ASTM C 150, Type III, high early strength, for laying masonry when outside temperature is less than 50°F.
 3. Provide non-staining Portland cement of natural color or of the color required to be compatible with the required colored mortar pigment selected by Owner.

4. Product and Manufacturer: Provide one of the following:
 - a. Atlas Type I and Atlas Type III Portland Cement by Lehigh Portland Cement Company.
 - b. Or equal.
5. Product and Manufacturer: Provide one of the following:
 - a. Atlas White Portland Cement Type I and Type III by Lehigh Portland Cement Company.
 - b. Or equal.
- B. Masonry Cement: Provide the following for masonry cement mortars:
 1. ASTM C 91, Type S; proportioned as specified to comply with ASTM C 270.
 2. Maximum Air Content, ASTM C 91: 18 percent.
 3. Non-staining and of the color required to be compatible with the required colored mortar pigment selected by Owner.
 4. Product and Manufacturer: Provide one of the following:
 - a. Atlas Custom Color Masonry Cement Type S by Lehigh Portland Cement Company.
 - b. Or equal.
- C. Hydrated Lime: ASTM C 207, Type S, or lime putty ASTM C 5.
- D. Sand Aggregates:
 1. ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.
 2. White Mortar Aggregates: Provide natural white sand or ground white stone for Portland cement-lime mortars.
 3. Colored Mortar Aggregates: Provide ground marble, granite or other sound stone, as required to match the sample approved by Owner for Portland cement-lime mortars.
 4. Fine Aggregate for Grout: Sand, ASTM C 404, Size No. 1.
 5. Coarse Aggregate for Grout: ASTM C 404, Size No. 8 or Size No. 89.
- E. Colored Mortar Pigments: Provide the following for Portland cement-lime mortars:
 1. Commercial iron oxide, manganese dioxide, ultramarine blue, chromium oxide, or carbon black, compounded for use in mortar mixes.
 2. Do not exceed pigment to cement ratios, by weight of 1 to 35 for carbon black and 1 to 7 for other pigments.

3. Product and Manufacturer: Provide one of the following:
 - a. Sonobrite by Sonneborn Building Products Division Rexnord Chemical Products Incorporated.
 - b. Or equal.
 4. Submit complete selection of manufacturer's standard and custom colors for final selection by Owner.
- F. Water: Free from injurious amounts of oils, acids, alkalis, or organic matter, and clean, fresh and potable.
- G. Waterproofing Admixture:
1. Proportion: In strict accordance with manufacturer's instructions.
 2. Product and Manufacturer: Provide one of the following:
 - a. Hydrocide Powder by Sonneborn Building Products Division Rexnord Chemical Products Incorporated.
 - b. Or equal.

2.02 MORTAR MIXES

- A. General:
1. Anti-Freeze Admixture or Agents: Not permitted.
 2. Calcium Chloride: Not permitted.
- B. Mortar for All Other Unit Masonry: Comply with ASTM C 270, Table 2, except limit materials to those specified herein, do not substitute ASTM C 91 masonry cement for ASTM C 150 Portland cement without an approved shop drawing review by Owner, and limit cement to lime ratio by volume as follows:
1. Type M:
 - a. Provide the following proportions by volume:
 1. Portland Cement: 1 part.
 2. Hydrated Lime or Lime Putty: 1/4 part.
 3. Aggregate Ratio (Measured in Damp Loose Condition): Not less than 2-1/4 and not more than 3 times the sum of the volumes of cement and lime.
 - b. Property Specification:
 1. Average Compressive Strength, ASTM C 270: 2500 pounds per square inch.
 2. Minimum Water Retention, ASTM C 270: 75 percent.

3. Maximum Air Content, ASTM C 270: 12 percent.
2. Type S:
 - a. Provide the following proportions by volume:
 1. Portland Cement: 1 part.
 2. Hydrated Lime or Lime Putty: Over 1/4 to 2 maximum.
 3. Aggregate Ratio (Measured in Damp Loose Condition): Not less than 2-1/4 and not more than 3 times the sum of the volumes of cement and lime.
 - b. Property Specification:
 1. Average Compressive Strength, ASTM C 270: 1800 pounds per square inch.
 2. Minimum Water Retention, ASTM C 270: 75 percent.
 3. Maximum Air Content, ASTM C 270: 12 percent.
- C. Grout:
 1. Fine Grout:
 - a. Provide the following proportions by volume:
 1. Portland Cement: 1 part.
 2. Hydrated Lime or Lime Putty: 0 to 1/10 part.
 3. Aggregate Ratio (Measured in a Damp Loose Condition): Sand; not less than 2-1/4 and not more than 3 times the sum of the volumes of cement and lime.
 - b. Mix grout to have a slump of 10 inches $\pm$ 1-inch at time of placement.
 2. Coarse Grout:
 - a. Provide the following proportions by volume:
 1. Portland Cement: 1 part.
 2. Hydrated Lime or Lime Putty: 0 to 1/10 part.
 3. Fine Aggregate Ratio (Measured in a Damp Loose Condition): Sand; not less than 2-1/4 and not more than 3 times the sum of the volumes of cement and lime.
 4. Coarse Aggregate Ratio: Not less than 1 and not more than 2 times the sum of the volumes of cement and lime.
 - b. Mix grout to have a slump of 10 inches $\pm$ 1 inch, at time of placement.

3. Grout Fill Around Reinforcement in Masonry Lintels and Bond Beams: Portland cement, sand, gravel and water, to be proportioned as required and bond beam to provide a 28-day minimum compressive strength of 4000 pounds per square inch.
- D. Colored Pigmented Cement Mortar: For Portland cement-lime mortars proportion pigments with other ingredients as follows:
 1. Mix to match sample approved by Owner.
 2. For black mortar mix with 1/8 part black iron oxide per part of Portland cement and reduce lime content to not more than 1/10 part.
- E. Colored Aggregate Mortar: For Portland cement-lime mortars proportion colored aggregate with other ingredients to match sample approved by Owner.
- F. Stearate Additive: Add to mix in amount equal to not more than 3 percent of the weight of cement.

PART 3 EXECUTION

3.01 PREPARATION

- A. Measurement of Materials:
 1. Cement and Hydrated Lime: Batched by the bag.
 2. Sand: Batched by volume in suitably calibrated containers, provided proper allowance is made for bulking and consolidation and for weight per cubic foot, of contained moisture.
 3. Proportion of Volumetric Mixtures: One 94-pound sack of Portland cement and one 50-pound sack of hydrated lime constitute nominal one cubic foot.
 4. Shovel measurement: Not permitted.
- B. Mortar Mixing:
 1. Type of Mixer: Machine mix in approved mixer in which the quantity of water is accurately and uniformly controlled.
 2. While mixer is in operation add approximately 3/4 the required water, 2 the sand, all the cement, then add remainder of sand.
 3. Allow batch to mix briefly then add water in small quantities until satisfactory workability is obtained.
 4. Mix for not less than five minutes after all materials have been added.
 5. Hydrated Lime for Mortar Requiring Lime Content: Use dry-mix method. Turn over together the materials for each batch until the even color of the mixed, dry materials indicates that cementitious material has been thoroughly distributed throughout the mass, then add water to obtain required plasticity.
 6. Lime putty if approved for use shall be prepared in accordance with ASTM C 5.

7. Waterproofing Admixture: Add to mortar mix for all exterior masonry in strict accordance with manufacturer's instructions.
8. The mixer drum shall be completely emptied before recharging the next batch.
9. Limit batch size to avoid retempering. Retempering of mortar shall not be permitted.

3.02 INSTALLATION

- A. Refer to the following:

1. Section 04201, Unit Masonry Construction.

3.03 FIELD QUALITY CONTROL

- A. Contractor shall engage an independent testing laboratory acceptable to Owner, to take samples and conduct tests to evaluate air entrainment, water retention and the compliance of materials with the Specifications and to determine the compressive strength of mortar and grout. Tests shall be conducted in accordance with ASTM C 91. Tests results shall be made available to Owner prior to the commencement of work.
- B. After the initial test, Owner will require a maximum of five additional tests to be conducted at his discretion.

END OF SECTION

SECTION 04150

MASONRY ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish all masonry accessories work.
2. This Section specifies the masonry accessories for work specified in the following:
 - a. Section 04201, Unit Masonry Construction.
 - b. Section 04220, Concrete Unit Masonry.
3. The types of masonry accessories work required include the following:
 - a. Continuous horizontal wire reinforcing and ties.
 - b. Individual wire ties.
 - c. Anchoring devices.
 - d. Miscellaneous masonry accessories.

B. Related Sections:

MORTAR	Section 04100
UNIT MASONRY CONSTRUCTION	Section 04201
MISCELLANEOUS FABRICATIONS	Section 05500

1.02 QUALITY ASSURANCE

- A. Codes: Comply with the applicable requirements of the New York State Uniform Fire Prevention and Building Code for types of masonry accessories work shown and specified.
- B. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.
 1. ASTM A 82, Cold-Drawn Steel Wire for Concrete Reinforcement.
 2. ASTM A 153, Zinc-Coating (Hot Dip) on Iron and Steel Hardware.
 3. ASTM A 615, Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 4. ASTM A 663, Steel Bars, Carbon, Merchant Quality, Mechanical Properties.
 5. ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures."

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval copies of manufacturer's specifications and installation instructions for each masonry accessory required. Include data substantiating that materials comply with specified requirements, and where each masonry accessory shall be used in the work.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Deliver accessories in original packages, plainly marked with identification of materials and manufacturer.
- B. Storage of Materials: Store and cover materials to prevent corrosion and deterioration.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Continuous Horizontal Wire Reinforcing and Ties for Masonry: Provide the following unless otherwise shown:
 - 1. General: Welded wire units prefabricated in straight lengths of not less than 10 feet, with matching corner "L" and intersection "T" units. Fabricate from cold-drawn steel wire complying with ASTM A 82, with deformed continuous 9 gage side rods and plain 9 gage cross rods, crimped for cavity wall construction, if any, with unit width of 1-1/2 to 2 inches less than thickness of wall or partition. All reinforcing and ties shall be hot dipped galvanized after fabrication with 1.5 ounces per square foot of zinc coating complying with ASTM A 153, Class B-1 unless otherwise specified.
 - 2. For single-wythe masonry, use units fabricated as follows:
 - a. Truss-type fabricated with one horizontal rod beneath each unit masonry shell wall and continuous diagonal cross-rods spaced not more than 16 inches on centers.
 - b. Product and Manufacturer: Provide one of the following:
 - 1. Lox-All #120 Truss-Mesh by Hohmann & Barnard, Inc., Happaug, N.Y.
 - 2. Or equal.
 - 3. For multi-wythe cavity wall masonry, use units fabricated as follows:
 - a. Truss and tab-type fabricated with single pair of side rods in interior wythe, adjustable hook-type box ties and cross- ties spaced not more than 16 inches on centers with lock bars welded across box ties all of 3/16-inch diameter cold-drawn steel wire. Eye-type units are not acceptable and shall not be approved by Owner. Space side rods for embedment in each face of back-up wythe and extend ties for proper embedment in facing wythe.
 - b. Product and Manufacturer: Provide one of the following:

1. Lox-All #165 Truss-Box-Mesh by Hohmann & Barnard, Inc., Hauppague, N.Y.
 2. Or equal.
4. Provide special shapes to accommodate curved cavity, multi-wythe and single-wythe wall construction.
- B. Individual Wire Ties for Masonry: Provide the following where shown:
1. General: Fabricate from 3/16-inch cold-drawn steel wire complying with ASTM A 82, with 1.5 ounces per square foot of hot-dip coating complying with ASTM A 153, Class B-1 crimped for use in cavity wall construction with unit width of 1-1/2 to 2 inches less than thickness of wall or partition.
 2. Where facing and back-up joints do not align, use adjustable two-piece ties as follows:
 - a. For use with hollow masonry units laid with cells vertical, and with solid masonry units or hollow units laid with cells horizontal, provide 4-inch wide adjustable rectangular shaped ties.
 - b. Product and Manufacturer: Provide one of the following:
 1. Adjustable Tie #800 by Hohmann & Barnard, Inc., Hauppague, N.Y.
 2. Or equal.
- C. Anchoring Devices for Masonry: Provide the following unless otherwise shown:
1. General:
 - a. Unless otherwise specified all anchoring devices for masonry shall be hot dipped galvanized after fabrication with 1.5 ounces per square foot of zinc coating complying with ASTM A 153, Class B-1 and B-2, crimped for cavity wall construction.
 - b. Flexible Anchors: Whenever masonry abuts structural walls or framework provide flexible anchors which permit horizontal and vertical movement of masonry but provides lateral restraint.
 2. For anchorage to concrete structure provide the following:
 - a. Two-piece anchors with 24 gage sheet metal dovetail and 16 gage rectangular corrugated tie 1-inch wide, sized to extend to within one inch of face of masonry or to a depth of 12 inches.
 - b. Product and Manufacturer: Provide one of the following:
 1. Corrugated Dovetail BrickTie #303 and Dovetail Slot #305 by Hohmann & Barnard, Inc., Hauppague, N.Y.
 2. Or equal.

3. Lateral Supporting Masonry Wall Anchors: Provide steel 3/8-inch thick by 2-inch wide galvanized 2' bar length 24" minimum.

a. Product and Manufacturer: Provide one of the following:

1. Rigid Partition Anchor #344 by Hohmann & Barnard, Inc., Hauppague, N.Y.
2. Or equal.

D. Miscellaneous Masonry Accessories: Provide the following where shown:

1. Reinforcing Bars:

- a. Deformed carbon steel, ASTM A 615, Grade 60 for bars No. 3 to No. 18 except as otherwise shown.
- b. Provide galvanized steel reinforcing bars complying with ASTM A 153, Class B-1, where shown.

2. Compressible Filler:

- a. Use foamed polyurethane strip saturated with polybutylene waterproofing material. When compressed to 50 percent of its original volume, filler shall hold six feet of water hydrostatically, and 10 feet at 60 percent compression. Filler shall maintain its resiliency to allow for installation in temperatures as low as 40 F. Filler shall be waterproof when compressed to 50 percent of its original volume in temperatures from -40 F to +200 F. Elongation shall be at least 325 percent with a tensile strength of not less than 53 pounds per square inch. No migration of polybutylene compound in the polyurethane strip will be allowed.
- b. Product and Manufacturer: Provide one of the following:
 1. Polytite by Polytite Manufacturing Corp., Cambridge, MA.
 2. Or equal.

3. Masonry Control Joint Components:

- a. Neoprene Joint Strips: Provide strip made from 1/16-inch cured, calendared neoprene with perforations.
 1. Product and Manufacturer: Provide one of the following:
 - a. Closed cell neoprene sponge #NS by Hohmann & Barnard, Inc., Hauppague, N.Y.
 - b. Or equal.
- b. Premolded Control Joint Strips: Solid polyvinyl chloride strips with a Shore A durometer hardness of 80 to 90, designed to fit standard sash block and maintain lateral stability in masonry wall, size and configuration shall be as specified.
 1. Product and Manufacturer: Provide one of the following:

- a. PVC control joint #VS-1118 by Hohmann & Barnard, Inc., Hauppague, N.Y.
 - b. Or equal.
 - c. Sealants: Section 07920, Calking and Sealants.
- 4. Weep Holes: Provide 3/8-inch outside diameter by 4-inches long clear plastic tubes.
- 5. Cavity Fill Mesh: Provide hot dip galvanized 2-inch mesh hardware cloth, backed with asphalt impregnated cloth below. Install below all block courses that are to be filled with mortar.

2.02 FABRICATION

- A. Shop-fabricate reinforcing bars which are shown or required to be bent or hooked. Comply with ACI 315 for the fabrication of reinforcing steel for unit masonry construction work.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Refer to the following:
 - 1. Section 04201, Unit Masonry Construction.

END OF SECTION

SECTION 04201

UNIT MASONRY CONSTRUCTION

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals required to furnish and install all unit masonry construction work. The work also includes:
 - a. Providing openings in unit masonry construction to accommodate the work under this and other Sections and building into the unit masonry construction all items such as sleeves, anchor bolts, inserts and all other items to be embedded in unit masonry construction for which placement is not specifically provided under other Sections.
 - b. Providing openings in unit masonry construction to accommodate the work under other contracts and assisting other Contractors in building into the unit masonry construction all items such as sleeves, anchor bolts, inserts and all other items required to be embedded in unit masonry construction under other contracts.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the unit masonry construction work.
2. Unit masonry construction work advanced without built-in flashings and other built-in work shall be removed and rebuilt at no additional expense to Owner even if discovered after unit masonry construction Work has been completed.
3. Coordinate the work of other Sections to avoid delay of the unit masonry construction work.
4. Notify other Contractors in advance of the erection of unit masonry construction work to provide other Contractors with sufficient time for the installation of items included in their contracts that must be installed with or before the unit masonry construction work.

C. Related Sections:

MORTAR	Section 04100
MASONRY ACCESSORIES	Section 04150

1.02 QUALITY ASSURANCE

- ###### A. Codes:
- Comply with the applicable requirements of the New York State Uniform Fire Prevention and Building Code for the types of unit masonry construction work shown.

B. Construction Tolerances:

1. Variation from Plumb: For lines and surfaces of columns, walls and arises, do not exceed 1/4 inch in 10 feet, or 3/8 inch in a story height or 20 feet maximum, nor

2 inch in 40 feet or more. Except for external corners, expansion joints and other conspicuous lines, do not exceed 1/4 inch in any story or 20 feet maximum, nor 2 inch in 40 feet or more.

2. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4 inch in any bay or 20 feet maximum, nor 3/4 inch in 40 feet or more.
3. Variation of Linear Building Line: For position shown and related portion of columns, walls and partitions, do not exceed 2 inch in any bay or 20 feet maximum, nor 3/4 inch in 40 feet or more.
4. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 2 inch.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM C 67, Standard Methods of Sampling and Testing Brick.
2. Brick Institute of America, "Technical Notes on Brick and Tile Construction".
3. Brick Institute of America, Technical Bulletin 1A, "Construction and Protection Recommendations for Cold Weather Masonry Construction".
4. Brick Institute of America, Technical Notes on "Cleaning Clay Products Masonry".
5. National Concrete Masonry Association, "Guide Specifications" and "Technical Bulletins".

1.03 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Complete layout of all masonry walls showing modular planning and all special shapes to be used in the work. Show all details for each condition encountered in the work. Provide plans and elevations drawn at 1/4 inch scale and details drawn at 1-1/2 inch scale. Show all items required to be built into unit masonry construction work.
2. Masonry control joint locations and details.
3. Shop drawings showing the location, extent and accurate configuration and profile of all items shown, specified and required by this and other sections to be built into the unit masonry construction work as the work progresses. Provide elevations drawn at 1/4 inch scale and all details drawn at 1-1/2 inch scale.
4. Shop drawing for fabrication, bending, and placement of reinforcing bars. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcing for unit masonry construction work.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver reinforcing to the site, bundled, tagged and marked. Use metal tags indicating size, lengths and other markings shown on approved shop drawings.

B. Storage of Materials:

1. Protect masonry materials during storage and construction with a properly erected shelter from wetting by rain, snow or ground water and from soilage or intermixture with earth or other materials.
2. Maintain temperatures in shelter so that masonry materials are above 20 F when laid.

C. Handling Materials:

1. Handle materials in a manner that minimizes chips, cracks, voids, discolorations or other defects which might be visible or cause staining in finished work.

1.05 JOB CONDITIONS

A. Site Facilities: Supplemental heat sources as may be required should Contractor wish to continue unit masonry construction work in cold weather are not available at the project site. The provision of all supplemental heat energy sources and equipment is the responsibility of Contractor.

B. Environmental Requirements:

1. Do not place any unit masonry construction work when air temperature is below 28 F on a rising temperature or below 36 F on falling temperatures without temporary heated enclosures or without heating materials or other precautions necessary to prevent freezing as specified in 1.05.C. below.
2. No frozen materials shall be used nor shall frozen unit masonry construction work be built upon.
3. Remove and replace all unit masonry construction work damaged by frost or freezing.

C. Protection:

1. Protect all unit masonry construction work against freezing for at least 48 hours after being placed.
 - a. Mean Daily Air Temperature 40 F to 32 F: Protect unit masonry construction work from rain or snow for 48 hours after installation.
 - b. Mean Daily Air Temperature 32 F to 25 F: Completely cover unit masonry construction work for 48 hours after installation.
 - c. Mean Daily Temperature 25 F to 20 F: Completely cover unit masonry construction work with insulating blankets for 48 hours.

- d. Mean Daily Air Temperature 20 F and Below: Maintain unit masonry construction work above 32 F for 48 hours by enclosure and supplementary heat.
 - 2. Protect partially completed masonry against rapid heat loss and from water entering masonry, when work is not in progress, by covering top of walls with strong, waterproof, nonstaining membrane. Extend membrane at least 2 feet down both sides of walls and secure in place using wall cover clamps spaced at intervals of 4 feet-0 inches and at each end and joint of covering.
 - 3. Do not apply uniform floor or roof loading for at least three days after completing masonry columns or walls.
 - 4. Do not apply concentrated loads for at least seven days after completing masonry columns or walls.
- D. Cold Weather Unit Masonry Construction Work:
- 1. All mortar for use in unit masonry construction work when the mean daily temperature is below 40 F shall be Portland cement- lime-sand mortars using high early strength Portland cement.
 - 2. Air Temperature 40 F to 32 F: Heat sand or mixing water to minimum of 70 F and maximum of 160 F.
 - 3. Air Temperature 32 F to 25 F: Heat sand and mixing water to minimum of 70 F and maximum of 160 F.
 - 4. Air Temperature 25 F to 20 F: Heat sand and mixing water to minimum of 70 F and maximum of 160 F. Provide heat on both sides of wall under construction. Employ wind brakes when wind is in excess of 15 mph.
 - 5. Air Temperature 20 F and Below: Heat sand and mixing water to minimum of 70 F and maximum of 160 F. Provide enclosure and auxiliary heat to maintain air temperature above 32 F. Temperature of masonry units when laid shall not be less than 20 F.
- E. Hot Weather Unit Masonry Construction Work: Protect unit masonry construction Work by methods acceptable to Owner, from direct exposure to wind and sun when the surrounding air temperature is 99 F in the shade with relative humidity less than 50 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer to the following Sections for required masonry materials.
 - 1. Section 04100, Mortar.
 - 2. Section 04150, Masonry Accessories.
 - 3. Section 04220, Concrete Unit Masonry.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine areas and conditions under which unit masonry construction work is to be installed, and notify Owner of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 PREPARATION

- A. Wetting of Masonry Units:

- 1. Face Brick: Wet brick having ASTM C 67 absorption rates in excess of 30 grams per 30 square inches per minute, so that rate of absorption when laid does not exceed this amount.
 - a. Determine absorption by placing 20 drops of water using a medicine dropper inside a circle 1 inch in diameter on typical units. If water is absorbed within 1-1/2 minutes, wet brick before laying.
- 2. Use wetting methods which ensure that each masonry unit is nearly saturated but surface dry when laid.
- 3. Except for absorbent units specified to be wetted, lay masonry units dry. Do not wet concrete masonry units.

- B. Cleaning Reinforcement: Before being placed, remove all loose rust, mill scale, earth, ice and other coatings (except galvanizing) from reinforcement. Do not use reinforcing bars with kinks or bends not shown on Drawings or approved shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.

3.03 INSTALLATION, GENERAL

- A. Thickness: Build walls, floors and other unit masonry construction work to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown or specified.
- B. Build chases and recesses as shown or required by others. Refer to paragraph 1.01.B. herein for the requirements of coordination with others. Provide not less than 8 inches of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.
- C. Leave openings for equipment, piping, ducts, and other items to be installed subsequent to starting of masonry work. After installation of said items, complete unit masonry construction work to match work immediately adjacent to openings.
- D. Cut masonry units using motor driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full size units without cutting wherever possible.

3.04 LAYING MASONRY WALLS

A. General:

1. Mortar Types: Unless otherwise indicated, use mortar as specified in Section 04100, Mortar, and as follows:
 - a. For exterior and all load-bearing wall work, use Type S mortar.
 - b. For interior non-load-bearing wall Work, use Type M mortar.
 - c. Use grout fill for structural requirements and for grouting reinforcing steel in unit masonry construction work.
 - d. Do not use mortar which has begun to set or if more than 2 hour has elapsed since initial mixing. Retemper mortar during the 2-hour period only as required to restore workability.
2. Layout walls in advance for accurate spacing of surface pattern bond with uniform joint widths and to properly locate openings, masonry control joints, returns and offsets. Avoid the use of less than half size units at corners, jambs and wherever possible at other locations.
3. Lay up walls plumb and true to comply with specified tolerances, with courses level, accurately spaced and coordinated with other work.
4. Pattern Bond:
 - a. Lay all concrete unit masonry construction work in running bond pattern with vertical joints in each course centered on units in courses above and below. Avoid the use of less than full size units.
 - b. Bond and interlock each course of each wythe at corners.
 - c. Do not use units with less than 8-inch horizontal face dimensions at corners or jambs.
5. Color and Texture:
 - a. Lay all concrete unit masonry construction work using mortar of standard color. Provide colored pointing mortar as selected by Owner. Provide white Portland cement with color as specified in Section 04100, Mortar, if required to provide color selected by Owner.

B. Mortar Bedding and Jointing:

1. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.
2. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout.

- a. Maintain joint widths shown, except for minor variations required to maintain pattern bond alignment. If not shown, lay walls with 3/8-inch joints.
 3. Cut joints flush for masonry walls that are to be concealed or to be covered by other materials, except paint, unless otherwise shown.
 4. Tool exposed joints, when mortar is "thumbprint" hard and slightly concave. Rake out mortar in preparation for application of caulking or sealants where required.
 5. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.
- C. Stopping and Resuming Work: Rake back 2-unit masonry length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly, if required, and remove loose masonry units and mortar prior to laying new masonry.
- D. Built-in Work:
1. As the work progresses, build in items shown, specified or required by others. Refer to paragraph 1.01.B. herein for the requirements of coordination with others. Fill cores in one block width solidly with masonry around built-in items.
 2. Fill space between hollow metal frames and masonry solidly with mortar.
 3. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of cavity fill mesh in the joint below and rod mortar or grout into core.
- E. Non-Load-Bearing Interior Partitions:
1. Build full height of story to underside of structure above, unless otherwise shown.
 2. Tie non-load-bearing partitions at top and sides with masonry anchors at terminations. Build in end blocks as shown and specified to facilitate placing compressible filler. Insert compressible filler, specified in Section 04150, Masonry Accessories in all horizontal and vertical joints where non-load-bearing masonry terminates. Insert filler 3/4 inches from both faces of masonry. Use filler four times as thick as the widest part of the joint. Thickness of filler shall be a minimum of 1.5 times the compressed thickness. Compress filler to less than thickness of joint and insert. At splices, overlap strips by 3 inches and compress ends to form tight joint. Finish with backer rod and sealant.
- F. Cavity Walls:
1. Keep cavity clean of mortar droppings during construction. Joints facing cavity shall be struck flush.
 2. Tie exterior wythe with back-up with continuous horizontal joint reinforcing, embedded in mortar joints at not more than 16 inches on centers vertically. Refer to Section 04150, Masonry Accessories for type of reinforcing required.
 3. Provide weep holes in exterior wythe of cavity wall located in all wall foundation courses and immediately above ledges and flashing, spaced 24 inches on centers, unless closer spacing is shown. Insert plastic weep tubes. Keep weep holes free of mortar and other obstructions.

G. Horizontal Joint Reinforcing:

1. Provide continuous horizontal joint reinforcing as shown and specified. Refer to Section 04150, Masonry Accessories, for type of reinforcing units required. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls and 2 inch at other locations. Lap reinforcement a minimum of 6 inches at ends of units. Do not bridge masonry control joints and building expansion joints with reinforcing.
2. Reinforce all walls with continuous horizontal joint reinforcing unless specifically noted or specified to be omitted.
3. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units in accordance with manufacturer's written instructions for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.
4. Space continuous horizontal reinforcing as follows:
 - a. For multi-wythe walls, solid or cavity, where continuous horizontal reinforcing also acts as structural bond or tie between wythes, space reinforcing as required by code but not more than 16 inches on centers vertically.
 - b. For single wythe walls, space reinforcing at 16 inches on centers vertically, unless otherwise shown.
5. Reinforce masonry openings greater than 12 inches wide, with horizontal joint reinforcing placed in two horizontal joints approximately 8 inches apart, immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 24 inches beyond jambs of the opening.
6. In addition to wall reinforcing, provide additional reinforcing at openings as required to comply with the above.

H. Grouting Structural Reinforced Unit Masonry Construction:

1. Limit extent of masonry construction to sections which do not exceed the maximum pour requirements specified. Provide temporary dams or barriers to control horizontal flow of grout at ends of wall sections. Build dams full height of grout pour. If masonry units are used, do not bond into permanent masonry wythes. Remove temporary dams after completion of grout pour.
2. Use fine grout for filling spaces less than 4 inches in both horizontal directions. Use coarse grout for filling spaces 4 inches or larger in both horizontal directions.
3. For spaces 10 inches and larger use concrete fill.
4. Low-Lift Grouting:
 - a. Use low-lift grouting techniques using fine grout mix for the following:
 1. Cavity walls.
 - b. Grout spaces less than 2 inches in width at intervals not to exceed 24 inches in lifts of 6 to 8 inches.

- c. Construct low-lift structural reinforced unit masonry construction work by placing reinforcing, laying masonry units and pouring grout as the work progresses.
- d. Place vertical reinforcing bars and supports prior to laying of masonry units. Extend above elevation of maximum pour height as required to allow for splicing. Horizontal reinforcing bars may be placed progressively with laying of masonry units.
- e. Limit grout pours as required to prevent displacement of masonry by grout pressures (blowout), but do not exceed 12 inch pour height.
- f. Lay masonry units prior to each grout pour, but do not construct more than 12 inches above maximum grout pour height in one exterior wythe and 4 inches above in other exterior wythe. Provide metal wall ties if required to prevent blowouts.
- g. Pour grout using container with spout and consolidate immediately by rodding or puddling; do not use trowels. Place grout continuously; do not interrupt pouring of grout for more than one hour. If poured in lifts, place from center-to-center of masonry courses. Terminate pour 1-1/2 inches below top of highest course in pour.

I. Anchoring Masonry Work:

- 1. Provide anchoring devices of the type shown and as specified under Section 04150, Masonry Accessories. If not shown or specified, provide standard type for facing and back-up involved.
- 2. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
 - a. Provide an open space not less than 2 inch in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.
 - b. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless otherwise shown.
 - c. Space anchors as shown, but not more than 24 inches on center vertically and 36 inches on center horizontally.
 - d. Provide end blocks where masonry abuts structural support to facilitate installation of compressible filler, backer rod and sealant.
 - e. Interior non-load intersecting walls shall be anchored by joint reinforcement spaced at a maximum distance of 16 inches or by steel connectors spaced at 48 inches vertically.
- 3. Anchor single wythe masonry veneer to backing with metal ties as follows:
 - a. Anchor veneer to structural members with metal anchors embedded in masonry joints and attached to structure. Provide anchors with flexible tie section, unless otherwise shown.

- b. Anchor veneer to concrete back up with dovetail anchors.

J. Masonry Control and Expansion Joints:

1. Provide vertical expansion, and control joints in masonry where shown. Build in related items as the unit masonry construction work progresses. Rake out mortar in preparation for application of calking and sealants. Refer to Section 07920, Caulking and Sealants.
2. Provide masonry control joints items specified under Section 04150, Masonry Accessories, where masonry control joints are shown.
 - a. Build in compressible fillers where shown. Install in accordance with manufacturer's written instructions.
 - b. Build in factory premolded control joint strips into masonry. Build in sash block and premolded control joint strips as the work progresses.
3. Masonry Control Joint Spacing: Where location of masonry control joints are not shown, place vertical joints spaced not to exceed 35 feet-0 inches on centers for concrete masonry wythes if reinforced. Locate masonry control joints at points of natural weakness in the unit masonry construction work including the following:
 - a. At structural column or joint between bays.
 - b. Above expansion or control joints in the supporting structure.
 - c. Above major openings at end of lintels upward and below at ends of sills downward. Place at one side of jamb for openings less than 6 feet 0 inches wide and at both sides for openings over 6 feet 0 inches wide.
 - d. At vertical chases, recesses and other points of reduction in wall thickness.
 - e. At locations where masonry wall height changes by more than 20 percent.
 - f. At a distance equal to the wall height from corners or intersections with other masonry.
 - g. Submit joint locations to Owner for approval.

K. Lintels and Bond Beams:

1. Provide steel lintels where shown and as specified in Section 05500, Miscellaneous Fabrications.
2. Provide masonry lintels and bond beams where shown and wherever openings of 16 inches or more are shown without structural steel lintels. Provide formed in place masonry lintels and bond beams. Temporarily support formed-in-place lintels and bond beams.
 - a. Unless otherwise shown, provide one horizontal number six deformed reinforcing bar for each 4 inches of wall thickness.

- b. For hollow masonry unit walls, use specially formed "U" shaped lintel and bond beam units with reinforcing bars placed as shown, filled with grout as specified in Section 04100, Mortar.
- 3. Provide minimum bearing at each jamb, of 8 inches for all openings.
- 4. On concrete unit masonry walls where pattern bond remains visually exposed, increase minimum bearing of masonry lintels to maintain joint pattern of wall and install so as to be indistinguishable from surrounding masonry.

L. Flashing of Masonry Work:

- 1. Provide concealed flashings in masonry work as shown. Refer to Sections 07620, Flashing and Trim, and 07650, Elastic Masonry Flashing, for type of flashing required. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Place through wall flashing on bed of mortar and cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 2 inches from face of wall, unless otherwise shown.
 - a. Extend flashings beyond edge of lintels and sills at least 4 inches and turn up edge on sides to form pan to direct moisture to exterior.
 - b. Install elastic flashings in accordance with manufacturer's instructions.
- 2. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings. Space 24 inches on center, unless otherwise shown.
- 3. Install reglets and nailers for flashing and other related work where shown to be built into unit masonry construction work.
- 4. Install elastic masonry flashing into cast-in-place elastic masonry flashing reglets with lead wedges and fill reglet with elastic flashing manufacturer's recommended bonding rubber-based adhesive cement.

3.05 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of sealant compounds.
- C. Cleaning Exposed, Unglazed Masonry Surfaces:
 - 1. Wipe off excess mortar as the work progresses. Dry brush at the end of each day's work.
 - 2. Final Cleaning: After mortar is thoroughly set and cured, clean sample wall area of approximately 20 square feet as described below. Obtain Owner's acceptance of sample cleaning before proceeding to clean remainder of masonry work.

- a. Dry clean to remove large particles of mortar using wood paddles and scrappers. Use chisel or wire brush if required.
- b. Presoak wall by saturating with water and flush off loose mortar and dirt.
- c. Scrub down wall with stiff fiber brush and a solution of 2 cups of sodium hexamita phosphate and 2 cups of household detergent dissolved in 1 gallon of water.
- d. Rinse walls, using clean, pressurized water, to neutralize cleaning solution and remove loose material.
- e. Acid cleaning of masonry shall not be permitted.

D. Protection:

- 1. Protect the unit masonry construction work from deterioration, discoloration or damage during subsequent construction operations. See Section 06100, Rough Carpentry.

END OF SECTION

SECTION 04220

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish concrete unit masonry work.
2. The extent of each type of concrete unit masonry is shown on the Drawings.
3. The types of concrete masonry units required include the following:
 - a. Hollow load-bearing units.
 - b. Split-face load bearing units.

B. Related Sections:

MORTAR	Section 04100
MASONRY ACCESSORIES	Section 04150
UNIT MASONRY CONSTRUCTION	Section 04201

1.02 QUALITY ASSURANCE

- A. Codes: Comply with applicable requirements of the New York State Uniform Fire Prevention and Building Code for types of concrete unit masonry shown and specified.
- B. Source Quality Control: Obtain each type of concrete masonry units from one manufacturer, cured by one process and of uniform texture and color or in an established uniform blend thereof.
- C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. ASTM C 33, Concrete Aggregates.
 2. ASTM C 90, Hollow Load-Bearing Concrete Masonry Units.
 3. ASTM C 331, Lightweight Aggregates for Concrete Masonry Units.
 4. ASTM C 426, Drying Shrinkage of Concrete Block.

1.03 SUBMITTALS

A. Samples: Submit for approval the following:

1. Each type of concrete masonry unit specified. Select each type of concrete masonry unit to show the range of color and texture which can be expected in the finished work.

2. Owner's review will be for color and texture only. Compliance with all other requirements is the exclusive responsibility of Contractor.

B. Shop Drawings: Submit for approval the following:

1. Copies of manufacturer's specifications and test data for each type of concrete masonry unit specified, including certification that each type of concrete masonry unit complies with the specified requirements. Include instructions for handling, storage, installation and protection of each type of concrete masonry unit.
2. Complete layout of all masonry walls showing modular planning and all special shapes to be used in the work. Show all details for each condition encountered in the work. Provide plans and elevation at 1/4 inch scale and details at 1-1/2 inch scale.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Deliver concrete masonry units in original packages and pallets, plainly marked with identification of materials and manufacturer.
- B. Storage of Materials: Store and cover concrete masonry units to prevent damage such as chipping and staining.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Size: Manufacturer's standard units with nominal face dimensions of 16-inches long by 8-inches high (15-5/8-inches by 7-5/8-inches actual).
- B. Special Shapes: Provide for interior and exterior corner shapes, solid jambs, lintels, bond beams, sash block, premolded control joint blocks, end blocks, headers, and other special conditions.
 1. Provide bullnose block for outside corners of all door openings.

2.02 CONCRETE MASONRY UNITS

- A. General: Where concrete masonry units are shown or specified, comply with the following requirements.
- B. Hollow Load-Bearing Concrete Masonry Units: ASTM C 90, Grade N-I.
- C. Weight:
 1. Provide units using aggregate complying with ASTM C 331 producing dry net weight of not less than 125 pounds per cubic foot.
- D. Curing:
 1. Cure units in a moisture controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C 90, Type I.
 2. Limit moisture absorption during delivery and until time of installation to the maximum percentage specified for Type I units for the average annual relative humidity as reported by the United States Weather Bureau Station nearest the

project site and the corresponding percentage of linear shrinkage of the concrete masonry units.

E. Exposed Faces: Provide manufacturer's standard color and texture.

F. Provide two-core concrete masonry units.

2.03 SPLIT-FACE CONCRETE MASONRY UNITS

A. General: Where split-face concrete masonry units are shown or specified, comply with the following.

B. Hollow Load-Bearing Concrete Masonry Units: Provide the following:

1. ASTM C 90, Grade N-I.
2. Minimum Compressive Strength: 3500 pounds per square inch average of five units; 3000 pounds per square inch minimum for an individual unit.
3. ASTM C 62, Grade SW.
4. ASTM C 426, Dry Shrinkage: 0.025 percent maximum average for five specimens.
5. ASTM C 67, Saturation Coefficient: 0.75 average.

C. Provide the following:

1. Two-core split-face units with integral color.
2. Manufacturer's complete selection of all standard and all custom colors for selection by Owner. Submit color chart for preliminary review by Owner.
3. All special factory fabricated profiles as shown, specified or required for complete Work, including, but not limited to, internal and external corners, sash blocks and half units.
4. Color, surface texture and aggregate uniform within the normal range established by sample submission.

E. Wherever specified or shown to "match existing", provide split-face concrete masonry units of matching color, texture and size.

F. Waterproofing Admixture: Manufacture all split-face concrete unit masonry with an integral waterproofing admixture as follows:

1. Proportion: In strict accordance with manufacturer's instructions.
2. Product and Manufacturer: Provide one of the following:
 - a. Dry-Block System by W.R Grace and Company.
 - b. Or equal.

H. Product and Manufacturer: Provide one of the following:

1. Split-Faced Concrete Unit Masonry by Barnes & Cone

2. Split-Faced Concrete Unit Masonry by Dagostino Building Blocks.
3. Or equal

PART 3 EXECUTION

3.01 INSTALLATION

- A. See Section 04201, Unit Masonry Construction.

END OF SECTION

SECTION 05500

MISCELLANEOUS FABRICATIONS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Ferrous and non-ferrous metal, 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, overhead door frames, wall brackets, custom pipe supports, etc.

1.02. RELATED SECTIONS

- A. Section 03252 – CONCRETE ANCHORS
- B. Section 04220 - UNIT MASONRY CONSTRUCTION
- C. Section 09900 - PAINTING

1.03. 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
NAAMM MBG 531	Metal Bar Grating Manual
NAAMM MBG 533	Welding Specifications for Fabrication of Steel, Aluminum, and Stainless Steel Bar Grating
OSHA 1910.27	Fixed Ladders
SSPC	The Society for Protective Coatings

1.04. 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.).

1.05. 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 embedded (cast-in) items.

1.06. 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.
- C. "C"-Shaped or "MC"-Shaped Steel Channels - ASTM A36.
- 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. Stainless Steel Structural Shapes – ASTM A276, Type 316 or Type 316/316L, annealed.
- J. Stainless Steel Angles and Plates - ASTM A276, Type 316 or Type 316/316L.
- K. Pipe
 - 1. Steel - ASTM A53, Grade B.
 - 2. Aluminum Alloy - 6061-T6.
- L. Bolts - ASTM F593 stainless steel, Type 316; ASTM A325N carbon steel; galvanized (A325) bolts as a manufactured fastener assembly to comply with ASTM A153 or F2329.

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.
- M. Bolted Attachment to Concrete and Masonry – For structural connections, use stainless steel threaded rods with chemical adhesive anchor system (Expansion anchors are not allowed unless specifically requested by Contractor for a particular application and approved by Engineer.)
- N. Cast-In Anchor Rods (Bolts) – ASTM F1554 anchor rods galvanized to ASTM A153. Use 3/4-inch diameter rods (L bolts) bent 90 degrees with 3-inch hook. Anchor rods shall be 18 inches long or as shown on Contract Drawings.

- O. 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.
- P. Touch-Up Primer for Galvanized Surfaces - Zinc-rich paint.

2.02. SHOP-FABRICATED ITEMS

- A. Bollards - 6-inch steel pipe; concrete filled, crowned cap; prime and finish paint.
- B. Galvanized Steel Shelf Angles - For support of joists and masonry. Prime paint before installation; exposed surfaces to be finish painted.
- C. Lintels
 - 1. Provide hot dip galvanized steel lintels as shown on Contract Drawings for masonry openings larger than 16 inches for concrete block and 8 inches for brick. At doors, windows, HVAC accessories, access panels, and pipes, extend 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 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.

2.03. 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. 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 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 for 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 grating of masonry.
- E. Perform field welding in accordance with AWS.
- F. Fasten aluminum fabrications using Type 316 stainless steel bolts and accessories.
- G. Fasten galvanized steel fabrications using Type 316 stainless steel bolts and accessories..

- H. Carbon steel bolts shall only be used for painted carbon steel framing connections.
- I. Isolate dissimilar metals with dielectric and appropriate fasteners.
- J. Obtain Engineer approval prior to site cutting or making adjustments not indicated on shop drawings.
- K. Prior to installation, aluminum surfaces in contact with concrete and/or masonry require backpainting.
- L. After erection, touch up paint welds, bolts, connection material, and abrasions.
- M. Top paint all exposed steel that is not galvanized, except for lintels.
- N. Touch up all galvanized surfaces with zinc-rich paint.

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 06100
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, material, equipment and incidentals as shown, specified and required to furnish and install all rough carpentry work. The work also includes:
 - a. Providing openings in rough carpentry to accommodate the work under this and other sections and building into the rough carpentry all items such as sleeves, anchor bolts, inserts and all other items to be embedded in rough carpentry for which placement is not specifically provided under other sections.
 - b. Provide openings in rough carpentry to accommodate the work under other contracts and assisting other contracts in building into the rough carpentry all such items as sleeves, anchor bolts, inserts and all other items required to be embedded in rough carpentry under other contracts.
2. Extent of the rough carpentry is shown.
3. Types of rough carpentry work required include, but are not necessarily limited to the following:
 - a. Wood framing, blocking, furring strips and other miscellaneous wood framing.
 - b. Plywood.
 - c. Miscellaneous accessories, fasteners and anchorages.
 - d. Wood trim.
 - e. Eave flashing.

B. Coordination:

1. Review installation procedures under other sections and coordinate the installation of items that must be installed with the rough carpentry.

C. Related Sections:

ASPHALT SHINGLES
FLASHING AND TRIM

Section 07311
Section 07620

1.02 QUALITY ASSURANCE

A. Design Criteria:

1. Lumber Standard - Comply with PS-20 except as otherwise specified.

- B. Codes: Comply with the applicable requirements of governing authorities and the New York State Uniform Fire Prevention and Building Code for size, spacing and attachment of wood members.
- C. Source Quality Control:
 - 1. Factory-mark each piece of lumber and type, grade, mill and grading agency.
 - 2. Shop-fabricate rough carpentry work to the extent feasible and where shop fabrication will result in better workmanship than feasible for on-site fabrication.
- D. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:
 - 1. American Lumber Standard Committee, National Grading Rule for Dimension Lumber, PS-20.
 - 2. West Coast Lumber Inspection Bureau, Grading Rules.
 - 3. American Wood Preserver's Association, M4.
 - 4. Federal Specification, TT-W-550, Wood Preservative: Chromated Copper Arsenate Mixture.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Storage of Materials:
 - 1. Keep materials dry during delivery and storage.
 - 2. Protect against exposure to weather and contact with damp or wet surfaces.
 - 3. Stack lumber, and provide air circulation within stacks.

1.04 JOB CONDITIONS

- A. Coordination: Fit rough carpentry work to other work and scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber:
 - 1. Nominal sizes are shown, except as shown by detail dimensions. Provide actual sizes as required by American Lumber Standard Committee, National Grading Rule for Dimension Lumber PS-20, for the moisture content specified for each use.
 - a. Provide dressed lumber, S4S, unless otherwise shown or specified.
 - b. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing.
 - 2. Provide the following grade and species:

- a. Construction Grade.
 - b. Douglas Fir, WWPA or Southern Pine, SPIB.
- B. Plywood:
 - 1. Exterior Type - Grade CC/EXT-APA, 3/4-inch thick.
 - 2. American Lumber Standard Committee, Plywood Standard, PS-1.
- C. Fasteners and Anchorages:
 - 1. Providing size and type as recommended by the State of New York Building Code, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices.
 - 2. Provide stainless steel nails for exterior work. Zinc coated nails for all other uses.
- D. Wood Trim: Southern Pine, Custom Grade, AWI Section 300.
- E. Eave Flashing: Asphalt saturated felt, non-perforated, 50 pounds, ASTM D 226, Type II.
- F. Lumber for Protection and Temporary Support: Size and grade to meet applicable requirements of the Occupational Safety and Health Act of 1970 and structural requirements.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrates and supporting structure and the conditions under which the rough carpentry work is to be installed, and notify Owner in writing of the conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 INSTALLATION

- A. General:
 - 1. Discard units of material with defects which might impair the quality of work and units which are too small to fabricate the work with minimum joints or the optimum joint arrangement.
 - 2. Set rough carpentry work accurately to required levels and lines with members plumb and true and accurately cut and fitted.
 - 3. Securely attach rough carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed rough carpentry work and fill holes. Use common wire nails, except as otherwise shown. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood, predrill as required.

B. Nailers and Blocking:

1. Provide wherever shown and where required for attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
2. Attach substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown.

C. Wood Framing: Install plumb and level in accordance with the requirements of the New York State Uniform Fire Prevention and Building Code. Provide wood framing for eaves, overhangs, roof penetrations and similar conditions.

D. Plywood:

1. Install in accordance with the requirements of the New York State Uniform Fire Prevention and Building Code.
2. Allow for installed clearances between individual plywood panels as specified by the plywood manufacturer. Leave 1/4-inch space at all panel edge joints and 1/8-inch space at all panel end joints, unless otherwise recommended by manufacturer.
3. Install plywood with long dimension across supports using 8d deformed shank nails spaced 6 inches at panel edges and 12 inches at intermediate framing. Stagger panel joints.
4. Provide continuous lumber blocking at all unsupported edges. All edges and ends of plywood panels shall rest on rafter framing or intermediate wood framing of the same size as top chord framing.
5. Ply-clips are not approved for the work.

E. Eave Flashing:

1. Install asphalt saturated felt to provide a continuous barrier which shall extend up long slope of roof measured from drip line to a point which measures 24-inches in from room-side face of exterior walls or 36-inches whichever is greater.
2. All laps in eave flashing shall be outside wall line and shall be continuously cemented with asphaltic plastic roof cement.
3. Eave flashing shall overhang metal drip by 3/8 inch.

END OF SECTION

SECTION 06191

FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all fabricated wood truss work.
2. Extent of the fabricated wood trusses is shown.
3. Types of fabricated wood truss work required include, but are not necessarily limited to, the following:
 - a. Shop-fabricated wood trusses.
 - b. Blocking, crossarms and bracing members.
 - c. All associated miscellaneous fasteners, anchors, connector plates and hardware.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the fabricated wood truss work.

C. Related Sections:

ROUGH CARPENTRY	Section 06100
ASPHALT SHINGLES	Section 07311

1.02 QUALITY ASSURANCE

- ###### A. Manufacturer's Qualifications: Shop Fabricated Timber Wood Trusses: Provide a manufacturer skilled and experienced in the design and fabrication of timber wood trusses similar to the type required.

B. Design Criteria:

1. All wood structural members shall be of sufficient size to carry the dead and required live loads without exceeding the allowable working stresses as contained in the standards listed in the New York State Uniform Fire Prevention and Building Code.
2. If rough sizes or finished sizes greater than American Lumber Standard dressed sizes are to be used in the work, computations shall be predicated on such actual sizes and submitted to the Owner.
3. Wood Truss: Comply with applicable design provisions of the National Design Specification for Wood Construction.
4. Fabricated Wood Trusses: Comply with the following:

- a. Top Chord:
 - 1. Minimum Nominal Chord Size: 2 x 6.
 - 2. Uniform Live Load: 30 pounds per square foot.
 - 3. Uniform Dead Load: Approximately 20 pounds per square foot.
 - 4. Concentrated Load: 250 pounds min. or equipment load; located to produce maximum stress in all members, where applicable to support equipment.
 - b. Bottom Chord:
 - 1. Minimum Nominal Chord Size: 2 x 6.
 - 2. Uniform Live Load: 20 pounds per square foot.
 - 3. Uniform Dead Load: 20 pounds per square feet.
 - 4. Concentrated Load: 250 pounds min. or equipment load; located to produce maximum stress in all members, where applicable to support equipment..
 - c. Wind Load: 20 pounds per square foot; check design for uplift.
 - d. Earthquake Zone: 2A.
 - e. Longterm Deflection on Total Load: Maximum 1/240.
 - f. Duration Factor: Use appropriate duration factor in determining critical load-duration combination.
 - g. Slope: As shown.
 - h. Size all truss members for most severe conditions of loading encountered by any single truss assembly.
- C. Codes: Comply with the applicable requirements of governing authorities and the New York State Uniform Fire Prevention Building Code for size, spacing, anchorage, loading, attachment and design of fabricated wood truss work.
- D. Source Quality Control: All lumber used for load-bearing purposes shall be identified by the grade-mark of an approved lumber grading or inspection agency. Grading practices and identification shall be in accordance with rules published by an approved agency. In lieu of a grade-mark material, a certificate of inspection as to species and grade issued by an approved lumber grading or inspection agency may be accepted for precut, remanufactured, or rough-sawn lumber.
- E. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:
- 1. American Lumber Standard Committee, National Grading Rule for Dimension Lumber, PS-20.

2. American Institute of Timber Construction, Timber Construction Standards, AITC 100.
3. American Institute of Timber Construction, Inspection Manual, AITC 200.
4. American Institute of Timber Construction, Timber Construction Manual.
5. Truss Plate Institute Incorporated, BWT-76, Bracing Wood Trusses: Commentary and Recommendations.
6. Truss Plate Institute Incorporated, QST-86, Quality Control Manual.
7. Truss Plate Institute Incorporated, TPI-85, Design Specification for Metal Plate Connected Wood Trusses.
8. Southern Forest Products Association, Southern Pine Use Guide.
9. Southern Pine Inspection Bureau, Standard Grading Rules for Southern Pine Lumber.
10. ASTM A 446/A446 M-83, Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
11. ASTM A 525, General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
12. Federal Specification, TT-W-550, Wood Preservative: Chromated Copper Arsenate Mixture.
13. National Forest Products Association, National Design Specification for Wood Construction.

1.03 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Copies of design calculations showing all loadings, assumed stresses, lumber type and grade for shop fabricated wood trusses. Include all details of wood truss and member fastening as well as complete listing of products used.
2. Fabricator's specification and installation instructions for the required work.
3. Shop drawings for all fabricated wood truss work showing full dimensions of each member and plans, elevations, sections and details of the entire structural system. Show large scale details not less than 3/4-inch to 1 foot-0 inch scale of connections, connectors and other accessories. Indicate species and stress grade of timber, and other variables in the required work. Truss manufacturer shall note all bracing materials which must be supplied for the work. Also note work not supplied by truss manufacturer and who is to supply such work.

B. Certificates: Submit for approval the following:

1. Provide shop-fabricated timber wood trusses work shop drawing and design calculations prepared, signed and stamped with the seal of a Registered Professional Engineer licensed to practice in the State of New York and recognized as an expert in the specialty involved.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Storage of Materials:

1. Keep materials dry during delivery and storage.
2. Protect against exposure to weather and contact with damp or wet surfaces.
3. Stack lumber and provide air circulation within stacks.
4. Comply with TPI, Commentary and Recommendation for Handling and Erecting Wood Trusses, NET-80.

1.05 JOB CONDITIONS

A. Protection: Maintain lumber free of undesirable exposure during erection until building enclosure is completed to the extent necessary for protection from weather.

B. Scheduling: Time delivery and installation of shop-fabricated wood truss work to avoid extended on-site storage and to avoid delaying work of other trades whose work must follow erection of the shop fabricated timber wood truss construction work.

C. Coordination:

1. Fit fabricated wood truss work to other work. Scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Timber, General:

1. Allowable working stresses shall be determined by machine stress rating as approved by the American Lumber Standards Committee.
2. Minimum dressed sizes corresponding to nominal sizes shall conform with the provisions of the American Lumber Standards.
3. Provide seasoned timber with 19 percent maximum moisture content at time of dressing.
4. Provide the following grade and species for shop-assembled wood trusses:
 - a. Select structural (stress-rated) Douglas Fir Grade Designation 2100f-1.8E.

B. Connectors:

1. Bolts: Comply with National Forest Product Association, National Design Specification for Stress-Grade Lumber and its Fastenings and with ASTM A 307.
2. Connector Plates: Minimum 20 gage hot-dipped galvanized steel connector plates with nail-like projections at all truss member intersections as required by manufacturer for loading conditions specified. In addition, provide anti-corrosion

coating which shall be finished as recommended by the manufacturer for highly corrosive environments.

3. In general, provide size and type as recommended by the New York State Uniform Fire Prevention and Building Code standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices.
4. Finish all bolts, anchors, accessory and support assemblies with hot-dip zinc coating complying with ASTM A 525.

2.02 FABRICATION

- A. To the greatest extent possible, prefabricate lumber prior to delivery.
- B. Fabricate wood trusses with wood chords and webs in accordance with designs submitted for shop drawing review as approved by Owner.
- C. Lumber defects such as wane or knots occurring in the connector plate area shall not affect more than ten percent of required plate area or number or effective teeth required for each truss member.
- D. Apply connector plates to both faces of truss at each joint. Provide firm, even contact between plate and lumber with maximum tolerance of 1/16 inch.
- E. Accurately cut and fabricate wood truss members so that all members have complete bearing and so that all fabricated wood trusses are uniformly constructed.
- F. Provide open joint tolerances in accordance with TPI Quality Control Manual QST-86.
- G. Product and Manufacturer: Provide one of the following:
 1. Reliable Truss Co., Inc., Deep River, CT.
 2. Or equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrates and supporting structures and the conditions under which the fabricated wood truss work is to be installed, and notify Owner in writing of the conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 INSTALLATION

- A. Set fabricated wood truss work accurately to required levels and lines, with members plumb and true and accurately cut and fitted. Erection bracing shall hold trusses straight and plumb and in safe condition until decking and permanent truss bracing has been fastened forming a structurally sound roof framing system.
- B. All erection and permanent bracing shall be installed and all wood trusses shall be permanently fastened before application of any load.

- C. Securely attach fabricated wood truss work to substrates by anchoring and fastening in accordance with Bracing Wood Trusses: Commentary and Recommendations (BWT-76) as published by the Truss Plate Institute. Install miscellaneous steel connectors, anchors, hurricane clips and accessories in accordance with manufacturer's recommendations and the New York State Uniform Fire Prevention and Building Code. Make tight connection between members. Install fasteners without splitting of wood, predrill as required.
- D. Space fabricated wood truss work as shown.
- E. Permanent structural cross-bracing to ensure overall rigidity of the roof system shall be in accordance with truss manufacturer's approved shop drawings for all bracing.
- F. Handle and temporarily support members in manner which prevents visible surface damage.
- G. Maintain expansion spaces as required by applicable standards.

3.03 REPAIR AND PROTECTION

- A. Repair damaged surfaces and finishes after completion of erection, or replace damaged members as directed by Owner where damage is beyond satisfactory repair at no further expense to Owner.

END OF SECTION

SECTION 07160

BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install bituminous dampproofing.
2. All concrete block walls shall receive bituminous dampproofing.
3. The types of asbestos-free bituminous dampproofing required include the following:
 - a. Cold asphalt (non-fibrated) solvent based dampproofing, for all masonry cavity walls.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the dampproofing.
2. Notify other Contractors in advance of the installation of the bituminous dampproofing to provide the other Contractors with sufficient time for the installation of items included in their contracts that must be installed before the bituminous dampproofing.

C. Related Sections:

CAST-IN-PLACE CONCRETE	Section 03300
UNIT MASONRY CONSTRUCTION	Section 04201

1.02 QUALITY ASSURANCE

- A. Installer Qualifications: Subcontract the dampproofing work to an experienced firm that specializes in bituminous dampproofing, and that is acceptable to the manufacturer of the bituminous materials.
- B. Quality Source Control: Obtain primary dampproofing materials from only one manufacturer.
- C. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.
 1. ASTM D 1187, Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 2. ASTM D 1227, Asphalt-Base Emulsions for Use as Protective Coating for Built-up Roofs.
 3. Federal Specification SS-153, Cement, Bituminous, Plastic.

4. Federal Specification SS-A-701B, Asphalt Petroleum (Primer, Roofing, and Weatherproofing).
5. ASTM D 41, Primer for use with Asphalt in Dampproofing and Waterproofing.
6. ASTM D 449, Asphalt used in Dampproofing and Waterproofing.
7. ASTM D 491, Asphalt Mastic used in Waterproofing.

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval the following: Manufacturer's specifications, installation instructions and general recommendations for each required dampproofing material. Include manufacturer's certification or other data substantiating that the materials comply with the requirements, and are recommended by the manufacturer for the application shown or specified.
- B. Certificates: Submit for approval the following:
 1. Certification indicating that bulk bituminous materials, if any, delivered to the site comply with the requirements. Include statistical and descriptive data for each product. Submit certificate with each load before it is used.
 2. Certification of VOC and asbestos-free compliance.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Storage of Materials: Store material in a manner recommended by the dampproofing manufacturer.
- B. Handling of Materials:
 1. Do not use solvent based dampproofing without adequate ventilation to prevent the build-up of explosive fumes.

1.05 JOB CONDITIONS

- A. Preparation: Do not proceed with dampproofing work until blocking, nailers, piping, conduit and other projections through the substrate have been installed, with substrate properly patched and sealed or flashed to receive the dampproofing.
- B. Environmental Conditions: When ambient temperature is 40 F or less do not proceed with dampproofing. Do not apply dampproofing materials to frozen substrates or to any substrate in a condition not complying with manufacturer's recommendations.

1.06 GUARANTEE

- A. For interior and concealed-in-wall uses, provide only a type of bituminous dampproofing material which is guaranteed by the manufacturer to be odor-free after drying for 24 hours.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cold Asphalt Dampproofing Materials Solvent Type:

1. Asphalt Compound: Manufacturer's standard asphalt and solvent compound, recommended for below-grade exterior and for above- grade interior applications, compounded to penetrate the substrate and build to a moisture-resistant, firm, elastic coating.
2. Provide non-fibrated type liquid conforming to SS-A-701B.
3. Product and Manufacturer: Provide one of the following:
 - a. Hydrocide 648, as manufactured by Sonneborn Building Products Division, Contech Incorporated.
 - b. Or equal.

PART 3 EXECUTION

3.01 INSPECTION

- #### A.
- Contractor and his installer must examine the substrates and the conditions under which the dampproofing is to be applied, and advise Owner in writing of unsatisfactory conditions. Do not proceed with the dampproofing work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 PREPARATION

- #### A.
- Clean the substrate of dirt, oil, loose materials and other substances which interfere with penetration, bond or performance of dampproofing materials.

3.03 INSTALLATION

A. Cold Bitumen on Exterior and Interior Surfaces:

1. Prime substrate if recommended by manufacturer's instructions, using type and quantity of primer recommended by manufacturer.
2. Apply coat of cold, liquid bituminous dampproofing material, by brushing or spraying at the rate of 1.0 gallon per 80 square feet, to produce a uniform dry film thickness of not less than 12 mils.
 - a. For exterior and interior surfaces, provide cold asphalt dampproofing materials.
 - b. Repeat the application specified above, after allowing 24 hours for drying of first coat. Apply second coat at the rate of 1.0 gallon per 120 square feet. Apply second coat at right angles to first coat.
3. Fill all cracks, crevices and grooves. Make sure coating is continuous and free from breaks and pinholes. Spread around all joints, grooves, and slots and into all chases, corners, reveals and soffits.

3.04 ADJUSTMENT AND CLEANING

- A. Protect other work from spillage of dampproofing materials, and prevent materials from penetrating and clogging drains and conductors.
- B. Replace or restore other work which is soiled or otherwise damaged by the installation of the dampproofing.

END OF SECTION

SECTION 07210

BUILDING INSULATION

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all building insulation Work.
2. The extent of each type of building insulation is shown or is specified herein.
3. The types of building insulation Work required include, but are not necessarily limited to, the following:
 - a. Glass fiber insulation.
 - b. Foam plastic insulation.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the insulations.

C. Related Sections:

UNIT MASONRY CONSTRUCTION	Section 04201
CONCRETE UNIT MASONRY	Section 04220
GYPSUM WALLBOARD	Section 09250

1.02 QUALITY ASSURANCE

- A. Design Criteria: Thermal Conductivity: The thicknesses shown are for the thermal conductivity, k-value at 75 F, specified for each material. Provide adjusted thicknesses as directed for the use of material having a different thermal conductivity.
- B. Requirements of Regulatory Agencies: Comply with fire-resistance and flammability ratings as shown and specified; and comply with code interpretations by governing authorities.
- C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:
1. ASTM C 177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 2. ASTM C 203, Breaking Load and Flexural Properties of Block-Type Thermal Insulation, Test Method for.
 3. ASTM C 272, Water Absorption of Core Materials for Structural Sandwich Constructions, Test Method for.

4. ASTM C 518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
5. ASTM C 520, Standard Test Method for Density of Granular Loose Fill Insulations.
6. ASTM C 549, Standard Specification for Perlite Loose Fill Insulation.
7. ASTM C 550, Practice for Trueness and Squareness of Rigid Block Thermal Insulation.
8. ASTM D 696, Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics.
9. ASTM D 1621, Compressive Properties of Rigid Cellular Plastics, Test Method for.
10. ASTM D 1622, Apparent Density of Rigid Cellular Plastics, Test Method for.
11. ASTM D 2126, Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
12. ASTM D 2842, Standard Test Method for Water Absorption of Rigid Cellular Plastics.
13. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials.
14. ASTM E 96, Standard Test Method for Water Vapor Transmission of Materials.
15. ASTM E 119, Standard Methods of Fire Tests of Building Construction and Materials.
16. ASTM E 136, Test Method for Behavior of Materials in a vertical tube furnace at 750°C.
17. Federal Specification FS HH-I-515D, Insulation, Thermal (Loose Fill for Pneumatic or Poured Applications); Cellulosic or Wood Fibers.

1.03 SUBMITTALS

- A. Samples: Submit for approval the following:
 1. 12-inch by 12-inch samples of each required type of building insulation.
 2. Samples will be reviewed by owner for color and texture only. Compliance with all other requirements is the exclusive responsibility of contractor.
- B. Shop Drawings: Submit for approval the following:
 1. Copies of manufacturer's specifications and installation instructions for each type of building insulation specified, including data substantiating that the materials comply with specified requirements.
 2. Indicate by copy of transmittal form that Installer has received copy of manufacturer's installation instructions.

1.04 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Deliver materials to the site to ensure uninterrupted progress of the Work.
- B. Comply with manufacturer's recommendations for handling, storage and protection during the progress of the Work.

1.05 JOB CONDITIONS

A. Protection:

- 1. Do not allow building insulation materials to become wet or soiled, or covered with ice or snow.
- 2. Protect foam plastic building insulation from exposure to sunlight.
- 3. Do not allow building insulation to come into contact with welding operations or other fire or ignition sources.

B. Scheduling:

- 1. Do not deliver building insulation materials to the project site ahead of scheduled dates of installation.
- 2. Do not store more building insulation on site than is necessary to insure uninterrupted progress of the Work.
- 3. Proceed with building insulation Work only when preceding Work is ready to receive the Work of this Section.

C. Environmental Conditions:

- 1. Complete the installation and concealment of building insulation materials as rapidly as possible in order to avoid damage from adjacent construction operations and adverse weather conditions.
- 2. Do not apply pressure sensitive tape when temperature is below 35 F or above 110 F.

PART 2 PRODUCTS

2.01 MATERIALS

A. Glass Fiber Insulations: Provide the following types:

- 1. General: Provide insulations formed from glass fibers and resinous binders fabricated into flexible blankets, semi-rigid and rigid sheets complying with ASTM C 665, ASTM C 553, ASTM C 612 and FS HH-I-558B.
- 2. Flame-Resistant Vapor Barrier Faced Batt Insulation: Provide thermal batt insulation, faced on one side with a foil-reinforced-kraft laminate vapor barrier complying with ASTM C 665, Type III, Class A.

- a. Physical Properties:
 - 1. Thermal Conductivity (k), ASTM C 518: 0.33 Btu/in./ hr./sf/EF maximum.
 - 2. Density, ASTM C 303: 1.5 pcf.
 - 3. Water Vapor Transmission, ASTM E 96: 0.10 perm/inch.
 - 4. Flame Spread, ASTM E 84: 25.
 - 5. Smoke Developed, ASTM E 84: 50.
 - 6. Fuel Contributed, ASTM E 84: 50.
- b. Thickness: 8- inches.
- c. Width: 24- inches.
- d. Product and Manufacturer: Provide one of the following:
 - 1. FS-25 FRK Faced Thermal Batt Insulation, as manufactured by Owens-Corning Fiberglass Corporation, Toledo, OH.
 - 2. Or equal.

B. Perimeter Foundation Insulation: Provide the following:

- 1. Rigid Board: 100 percent virgin extruded polystyrene modified resin foam complying with FS-HH-I-524C, Type VII minimum, except where modified herein.
- 2. Molded blocks air dried for minimum of six weeks with less than 0.5 percent residual pentane prior to fabrication.
- 3. Dimension Tolerances, ASTM C 550:
 - a. Length: ± 1/16 inch.
 - b. Width: ± 1/16 inch.
 - c. Thickness: ±1/16 inch.
 - d. Squareness: ±1/16 inch.
 - e. Flatness: ± 1/32 inch.
- 4. Physical Properties:
 - a. Thermal Conductivity (k at 40 F), ASTM C 177 and ASTM C 518: 0.20 BTU/in./hr/s.f./°F.
 - b. Coefficient of Thermal Expansion, ASTM D 696: 3.5×10^{-5} in/in./F.
 - c. Compressive Strength (5% deflection), ASTM D 1621: 115 pounds per square inch minimum.

- d. Water Vapor Permeance, ASTM E 96: 1.0 perms/inch.
- e. Water Vapor Absorption, ASTM C 272: Less than 0.1 percent by volume maximum.
- f. Flame Spread, ASTM E 84: 175.
- g. Smoke Developed, ASTM E 84: 165.
- 5. Thickness: 2-inches.
- 6. Size: 2 foot-0 inches by 8 foot-0 inches.
- 7. Product and Manufacturer: Provide one of the following:
 - a. Styrofoam 115 High Load by the Dow Chemical Company, Midland, MI.
 - b. Or equal.
- C. Rigid Foam Board Cavity Wall Insulation: Provide rigid, reflective aluminum foil-faced both sides, glass fiber reinforced polyisocyanurate board complying with FS HH-I-1972/1, Class 2.
 - 1. Physical Properties:
 - a. Thermal Conductivity (k), ASTM C 518: 0.14 Btu/in./ hr./sf/EF.
 - b. Density, ASTM D 1622: Nominal 2 pcf.
 - c. Compressive Strength in Thickness Direction, ASTM D 1621: 25 psi.
 - d. Dimensional Stability, 7 Day Exposure as Percent Change in Length or Width, ASTM D 2126:

<u>Environment</u>	<u>Percent Change</u>
+200F	Less than 1
-40F	Less than 1
+158F/100 percent relative humidity	Less than 1
 - e. Coefficient of Linear Thermal Expansion
(+200 ± 2F to -40 ± 2F Temperature Range), ASTM D 696: 1.3×10^{-5} inches/in./°F.
 - f. Flexural Strength, ASTM D 203: More than 40 psi.
 - g. Water Vapor Transmission, ASTM E 96: Less than 0.03 perms/inch.
 - h. Liquid Water Absorption, ASTM C 272: 0.3 percent maximum increase in volume.
 - i. Flame Spread, ASTM E 84: 25 maximum.
 - j. Fuel Contributed, ASTM E 84: 10 maximum.
 - k. Smoke Development, ASTM E 84: 400 maximum.

2. Thickness: 2-inches.
3. Product and Manufacturer: Provide one of the following:
 - a. Thermax Insulation Board 600 Series, as manufactured by Celotex Building Products Division, The Celotex Corporation, Tampa, FL.
 - b. Or equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and the conditions under which the Work is to be performed, and notify owner in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to owner.

3.02 INSTALLATION

- A. General:
 1. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, submit to owner specific recommendations from manufacturer for approval before proceeding with the Work.
 2. Extend all insulations full thickness over entire surface to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation.
 3. Apply a single layer of insulation of the required thickness or the required thickness to provide the thermal value indicated, unless otherwise shown or required, to make up the total thickness.
- B. Batt Type Insulation:
 1. Install batt insulation above ceiling and between rafters as shown. Extend full width, length and height in all areas shown.
 2. Fit lightly around obstructions to form a Uniform insulated barrier.
- C. Board-Type Perimeter Insulation:
 1. Install perimeter insulation after concrete footings have been poured and before on-grade concrete slabs work begins.
 2. Remove projections which interfere with placement.
 3. Apply a single 3 foot-0 inch wide continuous layer of insulation of the required thickness at building perimeter, below grade whether or not shown. Stagger joints in insulation and butt insulation tightly together.
 4. Protect top surface of horizontal insulation (from damage during concrete work) by application of one of the types of protection course materials recommended by the insulation manufacturer.

5. On vertical surfaces, set units in adhesive applied in accordance with manufacturer=s instructions. Use type adhesive recommended by manufacturer of board-type perimeter insulation.
6. Tape bottom edge of insulation before temporarily attaching insulation to wall with mastic.
7. Tape all joints in vertical wall insulation.
8. Protect insulation on vertical surfaces (from damage during backfilling) by application of one of the types of protection course materials recommended by the insulation manufacturer. Set in adhesive accordance with the recommendations of the manufacturers of the insulation and the protection course material.

D. Unit-Type Building Insulation:

1. Apply insulation units of the type shown to the substrate by the method indicated. If not otherwise indicated and except for units resting on horizontal surfaces, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
2. Set reflective foil-faced units accurately with air space in front of foil as shown. Provide not less than 0.75 inch air space where ever possible.

3.03 ADJUSTMENT AND CLEANING

- A. Protect insulations from damage or abuse from other work until Final Acceptance.

END OF SECTION

SECTION 07311
ASPHALT SHINGLES

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all shingle work.
2. Extent of asphalt shingle is shown and is specified herein.
3. Types of asphalt shingles work required include, but are not necessarily limited to the following:
 - a. Super heavy-weight fiberglass asphalt shingles.
 - b. Custom ridge and hip shingles.
 - c. Ridge vents.
 - d. Miscellaneous materials and fasteners.

B. Related Sections:

ROUGH CARPENTRY
FLASHING AND TRIM

Section 06100
Section 07620

1.02 QUALITY ASSURANCE

- A. Installer Qualifications: Engage a single installer regularly engaged in asphalt shingle work and with experience in the application of types of materials required, and who agrees to employ only tradesmen with specific skill and experience in this type of work.
- B. Requirements of Regulatory Agencies: Provide labeled materials which have been tested and listed by UL for class and rating required by the State of New York Uniform Fire Prevention and Building Code.
- C. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.
 1. ASTM D 226, Asphalt-Saturated Roofing Felt for Use in Membrane Waterproofing and Built-Up Roofing.
 2. ASTM D 3018, Class A Asphalt Shingles Surfaced with Mineral Granules, Specification For.
 3. FS SS-C-153C, Cement, bituminous, plastic.

1.03 SUBMITTALS

- A. Samples: Submit for approval full size samples of color specified for asphalt shingle. Samples will be reviewed by Owner for pattern, texture and color only. Compliance with all other requirements is the exclusive responsibility of Contractor.
- B. Shop Drawings: Submit for approval copies of manufacturer's specifications, standard installation instructions, and spec-data sheet for asphalt shingles. Include manufacturer's certification or other data substantiating that the materials and finishes comply with the requirements.
- C. Warranty: Provide asphalt shingle manufacturer's warranty on installed work, agreeing to pay for repair or replacement of defective asphalt shingles as necessary to eliminate leaks. Period of warranty is 25 years after date of substantial completion.
- D. Maintenance Materials: Supply 5 percent additional stock. Store as directed by the Owner.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Deliver materials in original unopened packages, containers or bundles with grading labels intact and legible. Remove items delivered in broken, damaged, rusted or unlabeled condition from project site immediately.
- B. Storage of Materials: Allow no water staining of asphalt shingles during storage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Asphalt Shingles: Fiberglass-asphalt shingles with ceramic baked, granular surface; 240 pounds per square; 12 inches by 36-inches; self-sealing with 5 inch exposure design; color; Majestic Slate; UL Class A; ASTM D 3018, Type 1.
- B. Accessory Shingles: Complete selection of manufacturer's ridge and hip shingles of same color and type as specified but without laminated tabs.
- C. Asphalt-Saturated Roofing Felt: ASTM D 226, 15 pounds, organic unperforated, 36-inches wide.
- D. Nails: Galvanized steel material, size and shape as recommended by the manufacturer for type of shingle and application.
- E. Bituminous Plastic Cement: FS SS-C-153, Type I.
- F. Ridge Vents: Low profile self contained flexible ridge vent with insect barrier, raised ridge cap shall be completely concealed by roofing shingles.
- G. Product and Manufacturer: Provide the following:
 - 1. Royal Sovereign by GAF Materials Corp., Wayne, NJ.
 - 2. Or equal

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer must examine the sheathing and the conditions under which the asphalt shingle work is to be performed, and notify Owner in writing of unsatisfactory conditions. Do not proceed with the asphalt work until unsatisfactory conditions have been corrected in a manner acceptable to Owner.
- B. Verify that installation of metal flashings, sheathing and blocking has been completed.
- C. Verify that work of other trades which penetrates roof deck has been completed.

3.02 ROOF APPLICATION, ASPHALT SHINGLES

- A. Felt and Asphalt Shingle Application for 3 inch in 12 inch or Greater Slope:
 - 1. Install metal edge drip along bottom edge before felt is laid and to the sides after felt is laid.
 - 2. Apply felt over entire roof overlapping 2 inches horizontally.
 - 3. Apply eave flashing specified in Section 06100, Rough Carpentry, as recommended by the asphalt shingle manufacturer.
 - 4. Install starter course of asphalt shingles with tabs cut off at eave line.
 - 5. Install asphalt shingles as recommended by the manufacturer.
- B. Ridge Vent: Cover ridge vent with roofing shingles forming ridge cap as recommended by ridge vent manufacturer and with ridge cap overlap recommended by shingle manufacturer.
- C. Nailing: As recommended by the asphalt shingle manufacturer.
- D. Comply with named manufacturer=s written Aspec-data@ sheet installation recommendations.
- E. Provide double course shingles at hip and ridge locations.

3.03 ADJUST AND CLEAN

- A. Replace damaged asphalt shingles.

END OF SECTION

SECTION 07620

FLASHING AND TRIM

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide flashing and trim as shown and specified. The Work also includes:
 - a. Providing openings in flashing to accommodate the Work under this and other Sections and building into the flashing all items such as sleeves, anchor bolts, inserts and all other items to be embedded in flashing for which placement is not specifically provided under other Sections.
2. The extent of the flashing and trim Work is shown on the Drawings and specified herein.
3. Flashing and trim Work required include, but not necessarily limited to the following:
 - a. Drip flashing and fascia.
 - b. Vinyl soffit and trim.
 - c. Ridge vent.
 - d. Insulation baffles.
 - e. Miscellaneous materials.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the flashing and trim.
2. Notify other Contractors in advance of the installation of the flashing and trim to provide them with sufficient time for the installation of items included in their contracts that must be installed before the flashing and trim.

C. Related Sections:

UNIT MASONRY CONSTRUCTION	Section 04201
ASPHALT SHINGLES	Section 07311
CAULKING AND SEALANTS	Section 07920

1.02 QUALITY ASSURANCE

A. Installer Qualifications:

1. Engage a single installer who is a recognized sheet metal Contractor, skilled and experienced in the type of flashing and trim work required, and equipped to perform workmanship in accordance with recognized standards so that there will

be undivided responsibility for the performance of the Work. Submit name and qualifications to Owner.

B. Design Criteria:

1. Except as otherwise shown or specified, comply with the recommendations and instructions of the manufacturer of the flashing, trim, and asphalt shingles being installed.
2. Flashing and trim shall be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.
3. Attic ventilation system shall be designed to supply 1 square inch of free air ventilation for each 2.08 square foot of attic floor area. Provide 60 percent of ventilation at eaves and 40 percent of ventilation at roof peak.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM B 209, Aluminum Alloy Sheet and Plate.
2. ASTM D 412, Rubber Properties in Tension.
3. ASTM D 624, Rubber Property-Tear Resistance.
4. ASTM D 2240, Rubber Property-Durometer Hardness.
5. Aluminum Association, Designation System for Aluminum Finishes.

1.03 SUBMITTALS

A. Samples: Submit for approval 12-inch square samples of specified soffit to be exposed. Samples will be reviewed by Owner for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.

B. Shop Drawings: Submit for approval the following:

1. Copies of manufacturer's specifications, installation instructions and general recommendations for flashing, trim, soffit, insulation baffles, and ridge vents required. Include manufacturer's data substantiating that the materials comply with the requirements and in addition submit attic ventilation calculations.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver flashing and trim materials in manufacturer's original, unopened containers and rolls with labels intact and legible.

B. Storage of Materials:

1. Store materials in an area protected from construction traffic.
2. Store materials in same package in which they were shipped.

C. Handling of Materials: Protect flashing and trim from dents, scratches, warps or bends.

1.05 JOB CONDITIONS

A. Scheduling:

1. Do not proceed with the flashing and trim Work until substrate construction, cant strips, blocking, reglets and other construction to receive the work is completed.
2. Schedule the installation of flashing and trim to coincide with the installation of asphalt shingle roofing, blocking, nailers, reglets, framing at openings, curbs, parapets and other adjoining and substrate work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Metal Flashing and Trim:

1. Aluminum Drip Flashing and Fascia: Provide aluminum complying with ASTM A-526. Provide sheet aluminum 0.024-inches thick made of 3105 aluminum sheet. Finish shall include corrosion inhibitor primer and baked on acrylic topcoat. Color shall be white.
2. Product and Manufacturer:
 - a. F951Drip Edge and Type C Fascia by Alcoa Building Products, Sidney, OH.
 - b. Or equal.

B. Vinyl Soffit and Trim:

1. Vinyl shall be solid and extruded of PVC according to ASTM D 3679-33 and ASTM D 4477-94. Color shall be white.
2. PVC resin shall conform to the following:
 - a. Tensile Strength - 7100 PSI.
 - b. Specific Gravity - 1.39.
 - c. Hardness - 76 Shore D.
 - d. Flame Spread - <25.
3. Soffit Description:
 - a. Ventilated, perforated and interlocked design.
 - b. Thickness - 0.040 inches.
 - c. Ventilation Area - 12.8 in.².

4. Product and Manufacturer:

- a. Profit Soffit and MVQR05, Quarter-Round Moulding by Alcoa Building Products, Sidney, OH.

C. Ridge Vent:

- 1. Provide ridge vent where shown of nylon-polyester non-woven fabric. Provide the following:
 - a. Height - 0.9 inches raised ridge cap completely concealed by roofing shingles.
 - b. Width - 10.5 inches.
- 2. Product and Manufacturer:
 - a. Roll-Vent by Celotex Corp., Tampa, FL.
 - b. Or equal.

D. Insulation Baffles:

- 1. Provide baffles of coated-water resistant fiberboard for joist and rafter spacing of 24 inches on center.
- 2. Product and Manufacturer: Provide one of the following:
 - a. BV-24 by Ampcor Anderson Metal Products Company, Taylorsville, MS.
 - b. Or equal.

E. Miscellaneous Materials:

- 1. Nails, Screws and Rivets: Same material as flashing sheet, or as recommended by manufacturer of flashing sheet.
- 2. Bituminous Coating: SSPC-Paint 12, cold-applied solvent-type bituminous mastic coating for application in dry film thickness of 15 mils per coat.
- 3. Sealants: Refer to Section 07920, Caulking and Sealants.
- 4. Roofing Cement: FS SS-C-153, Type I (asphaltic).
- 5. Roofing felts: Asphalt saturated asbestos felt complying with ASTM D 250.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and the conditions under which the flashing and trim Work is to be performed, and notify the Owner in writing of unsatisfactory conditions. Do not proceed with flashing and trim Work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner.

3.02 PREPARATION

- A. Before installing flashing and trim, verify shapes, and dimensions to be covered.
- B. Prepare substrates as recommended by the sheet metal manufacturer.

3.03 INSTALLATION

A. General:

- 1. Separate dissimilar metals from each other by painting each metal surface in the area of contact with a heavy application of bituminous coating, or by other permanent separation as recommended by the manufacturers of the dissimilar metals. Comply with the following:
- 2. Provide thermal expansion for running trim, flashing, valleys, and other items exposed for more than 15 feet-0 inches continuous length. Maintain a watertight installation at expansion seams. Locate expansion seams as shown or, if not shown, at the following maximum spacings for each general flashing use:
 - a. Flashing and Trim: At 10 feet-0 inch intervals, and 2 feet-0 inch each side of corners and intersections.
- 3. On vertical surfaces lap 2-piece flashings a minimum of 3 inches.
- 4. On sloping surfaces, for slopes of not less than 6 inches in 12 inches, lap unsealed flashings a minimum of 6 inches. For slopes less than 6 inches in 12 inches use soldered flat locked seams.

- B. Installation of Aluminum Flashing and Trim: Bed base members and flashings of aluminum in roofing cement. Comply with manufacturer's instructions for installation and anchorage of units. Provide gasket-type washers under exposed screw and bolt heads. Shim and seal under units as required to provide continuous, level, plumb and true lines.

3.04 ADJUSTMENT AND CLEANING

- A. Protect flashing and trim until final acceptance of the Work.
- B. Do not permit workmen, or others, to step directly on flashing sheets in place, or to place or move equipment over flashing and trim surfaces. Protect surfaces during installation of permanent covering work and adjoining Work.

END OF SECTION

SECTION 07631
GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Precoated aluminum gutters and downspouts.

1.02. RELATED SECTIONS

- A. Section 01039 - COORDINATION
- B. Section 01300 - SUBMITTALS
- C. Section 01600 - MATERIAL AND EQUIPMENT
- D. Section 04201 - UNIT MASONRY CONSTRUCTION
- E. Section 06100 – ROUGH CARPENTRY
- F. Section 06191 – FABRICATED WOOD TRUSSES
- G. Section 07311 – ASPHALT SHINGLES

1.03. REFERENCES

- A. ASTM B209 - Aluminum and Aluminum Alloy Sheet and Plate.
- B. SMACNA - Architectural Sheet Metal Manual.
- C. AAMA 2605 - Voluntary Specifications, Performance Requirements, and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

1.04. 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.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

1.06. COORDINATION

- A. Coordinate work under provisions of Section 01039.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Hickman - Product: Commercial grade formed gutters (OGEE) and downspouts (DS66).
- B. MM Systems - Product: Equal to Hickman "OGEE".
- C. Metal-ERA - Product: Equal to Hickman "OGEE".
- D. Substitutions - Under provisions of Section 01600.

2.02. MATERIALS

- A. Aluminum Sheet - ASTM B209, aluminum alloy, .040-inch thick; plain finish, shop pre coated with Kynar 500 coating of color selected by architect.

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 "White."
- 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 07650

ELASTIC MASONRY FLASHING

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install elastic masonry flashing.
2. The extent of elastic masonry flashing work is indicated on the drawings.

B. The types of elastic masonry flashing required include the following:

1. Flexible flashing in exterior masonry wall construction.

C. Related Sections:

UNIT MASONRY CONSTRUCTION	Section 04201
FLASHING AND TRIM	Section 07620
CAULKING AND SEALANTS	Section 07920

1.02 QUALITY ASSURANCE

A. Source Quality Control: Obtain flexible flashing materials from only one manufacturer.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified:

1. ASTM D 412, Test for Rubber Properties in Tension.
2. ASTM D 570, Water Absorption of Plastics.
3. ASTM D 746, Test for Brittleness Temperature of Plastics and Elastometers by Impact.
4. ASTM D 1499, Recommended Practice for Operating Light and Water Exposure for Plastics.
5. ASTM D 2240, Test for Rubber Property - Durometer Hardness.

1.03 SUBMITTALS

A. Shop Drawings: Submit for approval the following:

1. Copies of specifications, installation instructions and general recommendations from the flashing materials manufacturer for the types of flashing products required. Include manufacturer's certification or other data substantiating that the materials comply with the requirements. Include documentation of improved performance claimed for products or methods which exceed the requirements.

1.04 PRODUCTS DELIVERY, STORAGE AND HANDLING

A. Delivery of Products:

1. Deliver products and materials in original unopened packages, containers or bundles with manufacturer's label intact and legible.
2. Remove items delivered in broken, damaged, rusted or unlabeled condition from the site immediately.

1.05 JOB CONDITIONS

- ### A.
- Coordinate elastic flashings with other work to ensure secure anchorage and water tight seals and to minimize exposure to puncture or other damage from the work of other trades. Refer to Section 04201, Unit Masonry Construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. PVC Sheet Flashing:

1. Virgin polyvinyl chloride with plasticizers and other modifiers formed into uniform flexible sheets not less than 20 mils thick, black, complying with the following:
 - a. Hardness, ASTM D 2240: 60 to 80 Shore A.
 - b. Tensile Strength, ASTM D 412: 2,000 pounds per square inch.
 - c. Ultimate Elongation, ASTM D 746: 250 percent.
 - d. Brittleness Temperature, ASTM D 746: -20°F.
 - e. Weathering Resistance, ASTM D 1499: No significant change after 5,000 hours of cycled water spray, 150°F temperature and carbon-arc light.
 - f. Resistance to Ozone Aging: No cracks for 5,000 hours exposure of 20 percent elongated sample at 100°F and 50 parts per million ozone.
 - g. Resistance to Water Absorption, ASTM D 570: Less than 0.5 percent weight gain for 48 hours of immersion at 122°F.
2. Products and Manufacturers: Provide one of the following:
 - a. Nervastral Seal-Pruf HD as manufactured by Nervastral, Inc.
 - b. Wascoseal as manufactured by Wasco Products, Inc.
 - c. Or equal.

B. Miscellaneous Materials:

1. Reglets: Rigid, PVC self-locking for concrete installation.

2. Adhesives: Provide the types of adhesive compounds and tapes recommended by the flashing sheet manufacturer for bonding of substrate, if required, for waterproof sealing of seams in the flashing and for waterproof sealing of joints between flashing, membrane, adjoining surfaces and projections through the flashing.
3. Sealants: Refer to Section 07920, Caulking and Sealants.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate and the conditions under which the flashing work shall be performed and notify Owner in writing of unsatisfactory conditions have been corrected in a manner acceptable to Owner.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with manufacturer=s instructions for handling and installation of the elastic flashing materials, except where more stringent requirements are shown or specified.
- B. Coordinate the installation of flashing materials and associated work so as to provide a complete system complying with the combined recommendations of manufacturers and installers involved in the work.
- C. Refer to Section 04201, Unit Masonry Construction for installation of flexible through wall flashing with masonry.

3.03 FIELD TEST

- A. Field test completed elastic flashing for watertightness as directed by the Owner.

3.04 ADJUSTMENT AND CLEANING

- A. Repair elastic flashing which leak due to improper installation.

END OF SECTION

SECTION 07920

CAULKING AND SEALANTS

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide caulking and sealants as shown and specified.
2. The extent of each type of caulking and sealant work is shown on the Drawings.
3. The types of caulking and sealant work required include the following:
 - a. All joints between concrete members and masonry.
 - b. All concrete to concrete joints.
 - c. All joints between masonry and metal.
 - d. All expansion joints in masonry and concrete.
 - e. All control joints.
 - f. All isolation joints between equipment and other items.
 - g. All locations whether or not indicated on the Drawings required to render the building watertight.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the caulking and sealants.
2. Notify other Contractors in advance of the installation of the caulking and sealants to provide them with sufficient time for the installation of items included in their contracts that must be installed before the caulking and sealants.
3. Coordinate the final selection of caulking and sealants to be compatible with all caulking and sealant substrates specified.

C. Related Sections:

FLASHING AND TRIM
ALUMINUM WINDOWS

Section 07620
Section 08520

1.02 QUALITY ASSURANCE

- ###### A. Installer Qualifications:
- Engage a single installer regularly engaged in caulking and sealant installation and with experience in the application of the types of materials required, and who agrees to employ only tradesmen with specific skill and experience in this type of work.

- B. Reference Standards: Comply with applicable provisions and recommendations, except as otherwise shown or specified.
1. ASTM C 510, Test for Staining and Color Change of Single or Multicomponent Joint Sealers.
 2. ASTM C 661, Test for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.
 3. ASTM C 793, Test for Effects of Accelerated Weathering on Elastomeric Joint Sealants.
 4. ASTM C 794, Test for Adhesion-in-Peel of Elastomeric Joints Sealants.
 5. Federal Specification, FS TT-S-00227, Sealing Compound: Elastomeric Type, Multi-component for Calking, Sealing, and Glazing in Buildings and Other Structures.
- C. Compatibility: Before purchase of each specified sealant, investigate its compatibility with the joint surfaces, joint fillers and other materials in the joint system. Provide only materials (manufacturer's recommended variation of the specified materials) which are known to be fully compatible with the actual installation condition, as shown by manufacturer's published data or certification.

1.03 SUBMITTALS

- A. Samples: Submit for approval the following:
1. Samples of each type of caulking and sealant specified, 12-inches long, in each of the manufacturer's standard colors.
 2. Samples will be reviewed by Owner for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.
- B. Shop Drawings: Submit for approval the following:
1. Copies of manufacturer's specifications, recommendations and installation instructions for each type of sealant, caulking compound and associated miscellaneous material required. Include manufacturer's published data, indicating that each material complies with the requirements and is intended for the applications shown.
- C. Guarantee: Submit for approval the following:
1. Copies of written guarantee agreeing to repair or replace sealants which fail to perform as specified.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
1. Deliver materials in caulking and sealant manufacturer's original unopened containers.
 2. Include the following information on the label:

- a. Name of material and supplier.
 - b. Formula or specification number, lot number, color and date of manufactures.
 - c. Mixing instructions, shelf life and curing time when applicable.
3. Failure to comply with these requirements shall be sufficient cause for rejection of the material in question, by the Owner, and his requiring its removal from the site. Supply new material conforming to the specified requirements at no additional cost to the Owner.

B. Storage of Materials:

1. Store materials so as to preclude the inclusion of foreign materials.
2. Do not store or expose materials to temperature above 90 F or store in direct sunshine.
3. Do not use materials which are outdated as indicated by shelf life.
4. Store sealant tape in a manner which will not deform the tape.
5. In cool or cold weather store containers where temperature approximates 75 F for 16 hours before using.
6. When high temperatures prevail store mixed sealants in a cool place.

C. Handling:

1. Handle materials carefully to prevent inclusion of foreign materials.
2. Do not open containers or mix components until necessary preparatory work and priming has been completed.

1.05 JOB CONDITIONS

A. Environmental Conditions:

1. Do not proceed with installation of caulking and sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.
2. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.
3. Wherever joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.
4. When high temperatures prevail avoid mixing sealants in direct sunlight.

- B. Protection: Do not allow caulking and sealants to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces including rough textured materials. Use

masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or the caulking and sealant materials.

1.06 WARRANTY

- A. Provide a written guarantee agreeing to repair or replace sealants which fail to perform as air-tight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data, as an inherent quality of the material for the exposure indicated. Provide warranty signed by the installer and Contractor. Provide warranty period of two years.

PART 2 PRODUCTS

2.01 MATERIALS

A. Exterior and Interior Vertical Joints:

1. Two-Component Urethane Sealant:

- a. Urethane-based, 2-part elastomeric sealant complying with the following:
1. FS TT-S-00227: Type 2 (non-sag) Class A.
 2. Adhesion-in-Peel, FS TT-S-00227 and ASTM C 794: Minimum 10 lbs/linear inch with no adhesion failure.
 3. Hardness (Standard Conditions), ASTM C 661: 24-35 (Shore A).
 4. Stain and color change, FS TT-S-00227 and ASTM C 510: No discoloration or stain.
 5. Accelerated Aging, ASTM C 793: No change in sealant characteristics after 250 hours in weatherometer.
 6. Rheological Vertical Displacement at 120 F, FS TT-S-00227: No sag.
- b. Product and Manufacturer: Provide one of the following:
1. Sonolastic NP 2 by Sonneborn Division of Chemrex, Inc., Shakopee, MN.
 2. Or equal.

B. Exterior and Interior Horizontal Joints:

1. Two-Component Polyurethane Sealant:

- a. Polyurethane-based, 2-part elastomeric sealant complying with the following:
1. FS TT-S-00227, Type 1 (self-leveling) Class A.

2. Water Immersion Bond, FS TT-S-00227: Elongation of 25% with no adhesive failure.
 3. Hardness (Standard Conditions), ASTM C 661: 30-40.
 4. Stain and Color Change, FS TT-S-00227 and ASTM C 510: No discoloration or stain.
 5. Accelerated Aging, ASTM C 793: No change in sealant characteristics after 250 hours in weatherometer.
- b. Product and Manufacturer: Provide one of the following:
1. Sonolastic SL2 by Sonneborn Division of Chemrex, Inc., Shakopee, MN.
 2. Or equal.
- C. Provide colors selected by Owner from caulking and sealant manufacturer's standard color charts. Manufacturers supplying sealants other than those specified above must provide the same colors available from those specified.
- D. Miscellaneous Materials:
1. Joint Cleaner: Provide the type of joint cleaning compound recommended by the sealant and caulking manufacturer, for the joint surfaces to be cleaned.
 2. Joint Primer and Sealer: Provide the type of joint primer and sealer recommended by the caulking and sealant manufacturer, for the joint surfaces to be primed or sealed.
 3. Bond Breaker Type: Polyethylene tape or other plastic tape as recommended by the caulking and sealant manufacturer, to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of caulking and sealant. Provide self-adhesive tape wherever applicable.
 4. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorptive material as recommended for compatibility with caulking and sealant by the caulking and sealant manufacturer. Provide size and shape of rod which will control the joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.
 5. Low Temperature Catalyst: Provide the type recommended by the caulking and sealant manufacturer.

2.02 MIXING

- A. Comply with sealant manufacturer's written instructions for mixing 2-component sealants.
- B. Thoroughly mix components before use.
- C. Add entire contents of activator can to base containers. Do not mix partial units.

- D. Mix contents for a minimum of 5 minutes or as recommended by the sealant manufacturer, until color and consistency are uniform.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer must examine the joint surfaces, substrates, backing, and anchorage of units forming sealant rabbet, and the conditions under which the caulking and sealant work is to be performed, and notify the Owner in writing of any conditions detrimental to the proper and timely completion of the work and performance of the sealants. Do not proceed with the caulking and sealant work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner.

3.02 JOINT SURFACE PREPARATION

- A. Clean joint surfaces immediately before installation of sealant compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with bonds of sealant compound as recommended by sealant manufacturer's written instructions.
- B. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer's written instructions indicate that alkalinity does not interfere with sealant bond and performance.
 - 1. Etch with 5 percent solution of muriatic acid.
 - 2. Neutralize with dilute ammonia solution.
 - 3. Rinse thoroughly with water and allow to dry before sealant installation.
- C. If necessary, clean porous materials such as concrete and masonry by grinding, sand blasting or mechanical abrading. Blow out joints with oil-free compressed air, or by vacuuming joints prior to application of primer or sealant.
- D. Roughen joint surfaces on vitreous coated and similar non-porous materials, wherever sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or wool to produce a dull sheen.

3.03 INSTALLATION

- A. Comply with sealant manufacturer's written instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.
- B. Prime or seal the joint surfaces wherever recommended by the sealant manufacturer. Do not allow prime or sealer to spill or migrate onto adjoining surfaces. Allow primer to dry prior to application of sealants.
- C. Apply masking tape before installation of primer, in continuous strips in alignment with the joint edge to produce sharp, clean interface with adjoining materials. Remove tape immediately after joints have been sealed and tooled as directed.
- D. Do not install sealants without backer rods or bond breaker tape.

- E. Roll the back-up rod stock into the joint to avoid lengthwise stretching. Do not twist, braid, puncture or prime backer-rods.
- F. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- G. Install sealants to depths as recommended by the sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead.
 - 1. For vertical joints subjected to normal movement and sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but not more than 2-inch deep or less than 1/4-inch deep.
- H. Remove excess and spillage of compounds promptly as the work progresses.
- I. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.

3.04 FIELD QUALITY CONTROL

- A. Where questions of compatibility of sealants and substrate arise the sealant manufacturer shall test the substrate in question for compatibility with the specified sealant and report his findings, with recommendations, to the Owner. Any required sealant change shall be at no additional cost to the Owner.

3.05 ADJUSTMENT AND CLEANING

- A. Repair sealant installation at leaks or, if leakage is excessive, replace sealant installation as directed.
- B. Clean adjacent surfaces of sealant or soiling resulting from the work. Use solvent or cleaning agent recommended by the sealant manufacturer. Leave all finish work in a neat clean condition.
- C. Protect the sealants during the construction period so that they will be without deterioration, soiling, or damage at the time of the Owner's acceptance.

END OF SECTION

SECTION 08115

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide hollow metal doors and frames as shown and specified.
2. The extent of hollow metal doors and frames is shown on the Drawings and schedules at the end of this section.
3. The types of hollow metal door and frame work required include the following:
 - a. Flush doors and frames.
 - b. Transoms and panels.

B. Related Sections:

UNIT MASONRY CONSTRUCTION	Section 04201
ROUGH CARPENTRY	Section 06100
CAULKING AND SEALANTS	Section 07920
FINISH HARDWARE	Section 08710
PAINTING	Section 09900

1.02 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide hollow metal doors and frames and accessories manufactured by a single firm specializing in the production of this type of work and complying with all applicable standards of the Steel Door Institute, recommended specifications for Standard Steel Doors and Frames (S.D.I.100).
- B. Reference Standards: Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.
 1. ANSI A 115, Specifications for Door and Frame Preparations for Hardware.
 2. ANSI A 224.1, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
 3. ASTM A 366, Steel, Carbon, Cold-rolled Sheet, Commercial Quality.
 4. ASTM A 568, Steel, Carbon and High Strength Low Alloy Hot Rolled Sheet, Hot Rolled Strip and Cold-Rolled Sheet, General Requirements.
 5. ASTM A 569, Steel, Carbon (0.15 Maximum Percent) Hot-Rolled Sheet and Strip, Commercial Quality.
 6. Steel Door Institute (SDI) 100, Recommended Specification for Standard Steel Doors and Frames.

7. UL, Building Materials Directory.

1.03 SUBMITTALS

A. Shop Drawings:

1. Submit for approval shop drawings for the fabrication and installation of hollow metal doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections.
 - a. Provide a schedule of doors and frames using same reference numbers for details and openings as those on the Drawings.

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver hollow metal doors and frames cartoned or crated to provide protection during transit and job storage.
2. Inspect hollow metal work upon delivery for damage. Minor damage may be repaired provided the finish items are equal in all respects to new work and acceptable to the Owner; otherwise, remove and replace damaged items.

- B. Storage of Materials: Store doors and frames at the building site under cover. Place units up off the floors in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters which could create a humidity chamber. If the cardboard wrapper on the door becomes wet, remove the carton immediately. Provide a 1/4-inch space between stacked doors to promote air circulation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Door Faces and Frames: Cold-Rolled Steel Sheets; commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.
- B. Supports and Anchors: Sheet metal, hot-dip galvanized after fabrication complying with ASTM A 153, Class B.
- C. Inserts, Bolts and Fasteners: Sheet metal hot-dip galvanized complying with ASTM A 153, Class C or D as applicable.

2.02 FABRICATION, GENERAL

- A. Fabricate hollow metal units to be rigid, neat in appearance and free for defects, warp or buckle. Accurately form metal to required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work, that cannot be permanently factory-assembled before shipment, to assure proper assembly at the site. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Filler to conceal manufacturing defects is not acceptable.

B. Exposed Fasteners:

1. Unless otherwise specified, provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.

C. Finish Hardware Preparation:

1. Prepare hollow metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final finish hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A 115, Specifications for Door and Frame Preparation for Hardware.
2. Reinforce hollow metal units to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at site.
3. Locate finish hardware as shown on approved shop drawings, in accordance with hardware templates provided by hardware manufacturer and in accordance with National Association of Architectural Metal Manufacturers, Hardware Locations for Custom Hollow Metal Doors. Refer to Section 08710.

D. Shop Painting:

1. Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before the application of the shop coat of paint.
2. Apply pretreatment to cleaned metal surfaces, using cold phosphate solution (SSPC-PT 2), hot phosphate solution (SSPC-PT 4) or basic zinc chromate-vinyl butyryl solution (SSPC-PT 3).
3. Refer to Section 09900 for field applied primer and finish paint for exterior or interior exposed ferrous or non-ferrous surfaces.
4. Apply shop coat of prime paint within time limits recommended by pretreatment manufacturer. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 1.5 mils.
5. Finish shall be rust inhibitive primer capable of passing a 500-hour salt spray and a 1000-hour humidity test in accordance with ASTM Specification B 117 as certified by an independent laboratory.

2.03 DOORS

A. Door Type:

1. Provide flush design doors, plain face 1-3/4 inches thick, seamless hollow construction, unless otherwise shown or specified.

B. Door Construction:

1. Fabricate doors of 2 outer stretcher-leveled steel sheets in accordance with ASTM Standards A 366 and not less than 16 gage. Construct doors with smooth, flush surfaces without visible joints or seams or exposed faces or stile edges. One visible lock seam edge shall be acceptable on the vertical hinge and lock edge of the doors. No fillers shall be used. Provide weep hole openings in the bottom of exterior doors to permit the escape of entrapped moisture.

2. Reinforce inside of doors with polystyrene solid core, fully weather sealed completely filling the inside of the door. The polystyrene material shall have a crushing strength not less than 4000 pounds per square foot.

C. Finish Hardware Reinforcement:

1. Refer to Section 08710 for finish hardware.
2. Hardware supplier shall furnish hollow metal door and frame manufacturer approved hardware schedule, hardware templates, and samples of physical hardware where necessary to insure correct fitting and installation.
3. Preparation includes sinkages and cut-outs for mortise and concealed hardware.
4. Provide reinforcements for both concealed and surface applied hardware:
 - a. Drill and tap mortise reinforcements at factory, using templates.
 - b. Install reinforcements with concealed connections designed to develop full strength of reinforcements.
5. Reinforce doors for required finish hardware, with minimum gages as follows:
 - a. Hinges: Steel plate 8 gage thick by 1-1/2-inches wide by 6 inches longer than hinge and secured by not less than 6 spot or projection welds.
 - b. Mortise Locksets and Dead Bolts: 14 gage steel sheet, secured with not less than 2 spot or projection welds.
 - c. Cylinder Locks: 12 gage steel sheet, secured with not less than 2 spot or projection welds.
 - d. Flush Bolts: 12 gage steel sheet, secured with not less than 2 spot or projection welds.
 - e. Surface-Applied Closers: 12 gage steel sheet, secured with not less than 6 spot or projection welds.

D. Product and Manufacturer: Provide one of the following:

1. L-16 plain for exterior, L-18 for interior by Steelcraft Manufacturing Company, Cincinnati, OH.
2. Or equal.

2.04 FRAMES

A. Frame Types:

1. Provide hollow metal frames for doors, transoms, side-lights, borrowed lights, and other openings of size and profile as shown or specified.

B. Frame Construction:

1. Fabricate frames of full-welded unit construction. Provide reinforced metered corners that are continuously welded for the full depth and width of the frame. Grind all exposed welds flush and smooth.
2. Form frames of cold rolled steel sheets of prime quality carbon steel in accordance with ASTM, A366.
3. Gage thickness of steel: Not less than 14.
4. Finish Hardware Reinforcement:
 - a. Reinforce frames for required finish hardware with minimum gages as follows:
 1. Hinges and Pivots: Steel plate 10 gage thick by 1-1/2-inches wide by 6-inches longer than hinge, secured by not less than 6 spot or projection welds.
 2. Strike Plate Clips: Steel plate 10 gage thick by 1-1/2-inches wide by 3-inches long.
 3. Surface-Applied Closers: 12 gage steel sheet, secured with not less than 6 spot or projection welds.
5. Mullions and Transom Bars:
 - a. Provide closed mullions and transom bars where shown. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.
6. Head Reinforcing: Where installed in masonry, leave vertical mullions in frames open at the top so they can be filled with grout.
7. Jamb Anchors: Furnish jamb anchors as required to secure frames to adjacent construction, formed of not less than 16 gage galvanized steel.
 - a. Masonry Construction: Adjustable, corrugated or perforated, T-shaped to suit frame size with leg not less than 2 inches wide by 10 inches long. Furnish at least 3 anchors per jamb up to 7 feet-6 inches height; 4 anchors up to 8 feet-0 inch jamb height. Furnish UL construction where required.
 - b. In-Place Concrete or Masonry: Anchor frame jambs with minimum 3/8-inch concealed bolts into expansion shields or inserts at 6 inches from top and bottom and 24 inches on center. Reinforce frames at anchor locations. Apply removable stop to cover anchor bolts.
8. Floor Anchors: Provide floor anchors for each jamb and mullion which extends to floor, formed of not less than 14 gage galvanized steel sheet, as follows:
 - a. Monolithic Concrete Slabs: Clip type anchors, with 2 holes to receive fasteners, welded to bottom of jambs and mullions.

9. Head Strut Supports: Provide 3/8-inch by 2-inch vertical steel struts extending from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable bolted anchorage to frame jamb members.
10. Head Reinforcing: For frames over 4 feet-0 inch wide, in masonry openings, provide continuous steel channel or angle stiffener, not less than 12 gage for full width of opening, welded to back of frame at head.
11. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
12. Rubber Door Silencers: Drill stop to receive 3 silencers on single-door frames and 4 silencers on double-door frames. Install plastic plugs to keep holes clear during construction.
13. Product and Manufacturer: Provide one of the following:
 - a. F-14 for exterior, F-18 for interior by Steelcraft Manufacturing Company, Cincinnati, OH.
 - b. Or equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer must examine the substrate and conditions under which hollow metal doors and frames are to be installed and notify the Owner in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner.

3.02 INSTALLATION

- A. Install hollow metal units and accessories in accordance with approved shop drawings, manufacturer's data, and as shown and specified.
- B. Frames that are bowed, twisted or otherwise unacceptable shall be removed from the job site and replaced with properly constructed frames.
- C. Setting Masonry Anchorage Devices:
 1. In masonry construction, building in of anchors and grouting of frames is included in Section 04201, Unit Masonry Construction.
 2. Provide masonry anchorage devices and machine screws where required for securing hollow metal frames to in-place concrete or masonry construction.
 3. Set anchorage devices opposite each anchor location, in accordance with details on approved shop drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.
 4. Floor anchors may be set with powder-actuated fasteners instead of masonry anchorage devices and machine screws, if so indicated on final shop drawings.

D. Placing Frames:

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged. Remove spreader bars only after frames have been properly set and secured.
2. Make field splices in frames as detailed on approved shop drawings, welded and finished to match factory work.

E. Protective Coating:

1. Protect inside, concealed, faces of door frames in plaster or masonry construction using fibered asphalt emulsion coating. Apply over shop primer approximately 1/8-inches thick and allow to dry before handling.

F. Door Installation:

1. Fit hollow metal doors accurately in their respective frames, with the following clearances:
 - a. Jambs and Head: 3/32 inch.
 - b. Meeting Edges, Pairs of Doors: 1/8 inch.
 - c. Bottom: 3/4-inch, where no threshold.
 - d. Bottom: At threshold, 1/8 inch.
2. Finish hardware installation is specified under Section 08710, Finish Hardware.

3.03 ADJUSTMENT AND CLEANING

- A. Final Adjustments: Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating conditions.
- B. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- C. Protection: Protect installed hollow metal doors and frames against damage from other construction activities.

(continued)

NORTH BROADWAY PUMP STATION DOOR SCHEDULE

Door No.	Rough Opening		Doors					Frame		Details ⁽¹⁾			Hardware Type ⁽³⁾	Remarks
	Width	Height	Type	Thickness	Width	Height	Material ⁽²⁾	Type	Material ⁽²⁾	Head	Jamb	Threshold		
101-1	3'-4"	7'-4"	A	1-3/4"	3'-0"	7'-2"	HM/SC	A	HM	A	A	A	#1	Single door

(1) See Architectural Drawing.

(2) Hollow metal doors to be painted. Color as selected by Owner.

(3) See Hardware Schedule at the end of Section 08710, Finish Hardware.

HM/SC = Hollow Metal Doors/Polystyrene Core.

DOOR TYPES:

- A Single exterior door.
- B Double interior door.
- C Double door.
- D Single door.

FRAME TYPES:

- A 1 inches by 5 inches
- B 1 inches by 4 inches

END OF SECTION

SECTION 08520

FIXED WINDOW SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide fixed window system as shown and specified.
2. The extent of fixed window system work is shown on the Drawings.
3. The types of laminate and glazing required include the following.
 - a. Laminate and framing exterior windows.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the fixed window system.

C. Related Work Specified Elsewhere:

CONCRETE UNIT MASONRY

Section 04220

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. The manufacturer of the laminate materials shall be a firm with documented experience in manufacturing the types of laminate specified.

B. Design Criteria: For size, type and thickness comply with the following:

1. New York State Uniform Fire Prevention and Building Code.
2. Consumer Product Safety Commission, Part 1201, Safety Standards for Architectural Glazing Materials.

C. Source Quality Control: To the greatest extent possible, provide all laminate and frame materials from one manufacturer.

D. Reference Standards: Comply with applicable provisions and recommendations of the following except as otherwise shown or specified.

1. Architectural Aluminum Manufacturers Association, AAMA 804.1
2. ANSI Z97.1, Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

1.03 SUBMITTALS

A. Shop Drawings:

1. Submit for approval copies of manufacturer's specifications, and installation instructions for each type of fixed window system and associated miscellaneous material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown.

1.04 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Delivery of Materials: Deliver system with manufacturer's labels intact. Do not remove labels until system has been installed. Keep laminate free from contamination by materials capable of staining laminate. Deliver glazing compounds and sealants in manufacturer's unopened, labeled containers.
- B. Handling of Materials: Protect laminate from edge damage at all times during handling, installation and operation of the building.

PART 2 PRODUCTS

2.01 LAMINATE WINDOW

A. Laminate:

1. 3-ply, extruded polycarbonate and acrylic sheet of the following construction; 2, 1/8 inch polycarbonate sheets for interior and exterior facing with 2 inch intermediate acrylic layer. Acrylic sheet shall be bonded to the polycarbonate sheets with resin interlayers. The total thickness of entire system shall not be less than .775 inches.
2. Minimum Flexural Strength: 13,500 psi.
3. Light Transmission: 50% - ASTM D1003.
4. Color: Bronze.
5. Rating: UL 752 Level 1, ASTM F1233-93 for .38 caliber bullet resisting protection.
6. Product and Manufacturer: Provide one of the following:
 - a. Lexgard MP-750 Laminate by General Electric Plastics, Pittsfield, MA.
 - b. Or equal.

B. Frame System:

1. Impact resistant extruded aluminum with 23 inch wide by 42 inch deep frame dimensions. Frame shall be predrilled and to have concealed anchor holes.
2. Finish: Bronze anodized.
3. Fasteners: Stainless steel.

4. Product and Manufacturer: Provide one of the following:
 - a. ICFW-1 Fixed Window Frame by Insulgard Corp., Hamden, CT.

2.02 GLAZING SEALANTS AND TAPES

- A. General:
 1. Colors: Provide manufacturer's standard colors as shown or, if not shown, provide color selected by Owner from manufacturer's standard colors to either blend or contrast with adjoining surfaces.
 2. Consult the manufacturer's technical representative to determine the actual hardness recommended for the conditions of installation and use.
 3. Compatibility: Before purchase of the specified glazing materials, investigate compatibility with the channel surfaces, joint fillers and other materials in the glazing channel. Provide only materials and manufacturer's recommended variation of the specified materials which are known to be fully compatible with the actual installation condition, as shown by manufacturer's published data or certification.

2.03 MISCELLANEOUS GLAZING MATERIALS

- A. Setting Blocks: Neoprene, 70-90 durometer hardness, with proven compatibility with sealants used as recommended by the glass manufacturer.
- B. Spacers: Neoprene, 40-50 durometer hardness, with proven compatibility with sealants used as recommended by the glass manufacturer.
- C. Compressible Filler Rod: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.
- D. Cleaners, Primers and Sealers: Type recommended by sealant, gasket and glass manufacturer.

PART 3 EXECUTION

3.01 PERFORMANCE

- A. Watertight and airtight installation of each piece of laminate system is required. Each installation must withstand normal temperature changes, wind loading, impact loading, and ballistics requirement stated herein without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and air-tight, deterioration of glazing materials and other defects in the Work.
- B. Laminate manufacturer's recommended channel dimensions are intended to provide for necessary minimum bite on the laminate, minimum edge clearance and adequate sealant thicknesses, with reasonable tolerances. The contractor is responsible for correct laminate size for each opening, within the tolerances and necessary dimensions established.

3.02 INSTALLATION

A. General:

1. Comply with combined recommendations of laminate window and sealant manufacturer and other materials used in glazing, except where more stringent requirements are shown or specified, and except where manufacturer's technical representatives direct otherwise.

3.03 PREPARATION FOR GLAZING

- A. Clean the glazing channel, or other framing members to receive laminate, immediately before glazing. Remove coatings which are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.
- B. Apply primer or sealer to joint surfaces wherever recommended by sealant and laminate manufacturer.

3.04 GLAZING

A. Tape and Sealant Glazing:

1. Cut glazing tape to length and set against permanent stops. Install horizontal strips first, extending over width of opening, before applying vertical strips. Place setting blocks at quarter points. Remove paper backing from tape. Position laminate on setting blocks and press against tape for full contact.
2. Place glazing tape on free perimeter of laminate. Seal butt joints of tape with joint sealant.
3. Install removable stop, avoiding displacement of tape, and exert pressure on tape for full continuous contact. Calk space above glazing tape to top of glazing stop. Tool exposed surfaces of calking compounds to provide a substantial "wash" away from the laminate.
4. Clean and trim excess glazing materials from the installation, and eliminate stains and discolorations.
5. Where wedge-shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when subjected to dynamic movement. Anchor gasket to stop with matching ribs, or by proven adhesives, including embedment of gasket tail in cured heel bead.

3.05 FIELD QUALITY CONTROL

- A. Repair glazing installation at leaks or, if leakage is excessive, replace glazing sealants as directed.
- B. Wherever nature of observed leakage indicates the possibility of inadequate glazing joint bond strength, the Owner may direct that additional testing be performed at a time when joints have been fully cured, followed by natural exposure through both extreme temperatures, and returned to the range of temperature in which it is feasible to conduct testing. Repair or replace work as required and directed.

3.06 ADJUSTMENT AND CLEANING

- A. Cure glazing sealants and compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- B. Remove and replace laminate which is chipped, cracked, abraded or damaged in other ways during the construction period, including natural causes, accidents and vandalism.

END OF SECTION

SECTION 08710
FINISH HARDWARE

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide finish hardware as shown and specified.
2. The extent of finish hardware is shown on the Drawings and in schedules. Finish hardware is defined to include all items known commercially as finish hardware, as required for swing doors, except special types of unique and non-matching hardware specified in the same Section as the door and door frame.
3. The types of finish hardware required include the following:
 - a. Mortise hinges.
 - b. Mortise locks and latch sets.
 - c. Exit devices.
 - d. Cylinders and keying system.
 - e. Door closers.
 - f. Wall and floor stops.
 - g. Stripping and seals.
 - h. Astragals.
 - i. Thresholds.
 - j. Silencers.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the finish hardware.
2. Notify other Contractors in advance of the installation of the finish hardware to provide them with sufficient time for the installation of items included in their contracts that must be installed before the finish hardware.

C. Related Sections:

HOLLOW METAL DOORS AND FRAMES

Section 08115

1.02 QUALITY ASSURANCE

- A. Supplier Qualifications: The finish hardware supplier shall have in his employ a member of the American Society of Architectural Hardware Consultants who shall be responsible for the complete finish hardware contract.
- B. Design Criteria:
1. Where the finish, shape, size or function of a member receiving finish hardware is such as to prevent the use of, or make unsuitable the types specified, furnish similar types having as nearly as practicable the same operation.
 2. If finish hardware for any location is not specified, provide finish hardware equal in design and quality to adjacent finish hardware for comparable openings.
 3. Furnish finish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements, as necessary for proper installation and function.
 4. Unless otherwise specified, comply with the National Builders Hardware Association, "Recommended Locations for Builders Hardware".
- C. Requirements of Regulatory Agencies:
1. Provide only finish hardware which has been tested, listed and labeled by UL for the types and sizes of doors required, and complies with the requirements of the door and door frame labels. Modify scheduled finish hardware, as required, to meet UL requirements.
 2. Codes: Comply with the applicable requirements of the New York State Uniform Fire Prevention and Building Code for the types of finish hardware specified.
- D. Source Quality Control: To the greatest extent possible, obtain each type of finish hardware from only one manufacturer.
- E. Reference Standards: Comply with the applicable provisions and recommendations of the following except where otherwise shown or specified:
1. FS TT-S-001657, Sealing Compound - Single Component, Butyl Rubber Based, Solvent Release Type.
 2. UL, Building Materials Directory.
 3. UL, Hardware, Automatic Flush or Surface Bolts.
 4. National Builders Hardware Association, Recommended Locations for Builders Hardware.

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval the following:
1. Copies of manufacturer's data for each item of finish hardware. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and exposed

finishes. Wherever needed, furnish templates to fabricators of other work which is to receive finish hardware.

2. Copies of the finish hardware schedule in the manner and format specified, complying with the actual construction progress schedule requirements (for each draft). Include a separate key schedule, showing clearly how the Owner's final instructions on keying of locks have been fulfilled. Finish hardware schedules are intended for coordination of the work. Review and acceptance by the Owner does not relieve the Contractor of his exclusive responsibility to fulfill the requirements as shown and specified.
3. Based on the finish hardware requirements specified, organize the final finish hardware schedule into "hardware sets," indicating complete designation of every item required for each door or opening. Furnish initial draft of schedule at the earliest possible date, in order to facilitate the fabrication of other work (such as hollow metal frames) which may be critical in the Project construction schedule. Furnish final draft of schedule after samples, manufacturer's data sheets, coordination with shop drawings for other work, delivery schedules and similar information have been completed and accepted.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver finish hardware sufficiently in advance of its setting for proper inspection.
2. Pack each piece of finish hardware separately, complete with screws, keying, instructions and templates, tagged to correspond with the approved finish hardware schedule.

B. Storage of Materials:

1. Provide secure lock-up for finish hardware stored at the site, but not yet installed.
2. Store finish hardware in manufacturers' original packages.

C. Handling of Materials: Control the handling and installation of finish hardware items which are not immediately replaceable, so that the completion of the work will not be delayed by finish hardware losses, both before and after installation.

1.05 JOB CONDITIONS

A. Scheduling: Delivery individually packaged finish hardware items at the proper time to the proper locations for installation.

1.06 SUBSTITUTIONS

A. Do not make substitutions after Owner's approval of final finish hardware schedule.

PART 2 PRODUCTS

2.01 MATERIALS AND FABRICATION

A. General:

1. Hand of Door: The Drawings show the swing or hand of each door leaf (left, right, reverse bevel, etc.). Furnish each item of finish hardware for proper installation and operation of the door swing as shown.
2. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels.
3. Base Metals: Produce finish hardware units of the basic metal and forming method specified, using the manufacturer's standard metal alloy, composition, temper and hardness. Do not substitute materials or forming methods for those specified.
4. Fasteners: Manufacture finish hardware to conform to published templates, generally prepared for machine screw installation. Do not provide finish hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
5. Furnish screws for installation, with each finish hardware item. Provide Phillips flat-head screws except as otherwise specified. Finish exposed (exposed under any condition) screws to match the hardware finish or, if exposed in surfaces on other work, to match the finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
6. Provide fasteners which are compatible with both the unit fastened and the substrate, and which will not cause corrosion or deterioration of finish hardware, base material or fastener.
7. Provide concealed fasteners for finish hardware units which are not exposed when the door is closed, except to the extent no standard manufacturer units of the type specified are available with concealed fasteners. Do not use through bolts for installation where the bolt head or the nut on the opposite face is exposed in other work under any condition, except where it is not possible to adequately reinforce the work and use machine screws or concealed fasteners of another standard type to satisfactorily avoid the use of through bolts.
8. Tools for Maintenance: Furnish a complete set of specialized tools as needed for Owner's continued adjustment, maintenance, removal and replacement of finish hardware.

B. Mortise Hinges:

1. Templates and Screws: Provide only template-produced units.
2. Base Metal: Except as otherwise specified, fabricate hinges from stainless steel and finish to match the latch and lock set.
3. Number of Hinges: Except as otherwise specified, provide 2 hinges on each door leaf of less than 60-inches height, and provide one additional hinge for each 30-inch, or fraction thereof, of height in excess of 60-inches.

4. Hinge Size: Except as otherwise specified or as required to comply with UL and NFPA, provide hinges of the following sizes:
 - a. Wide Exterior and Interior Doors:
 1. Maximum 48-inches wide: 5-inch heavy weight (0.190").
5. Types of Hinges: Provide full-mortise type, ball-bearing hinges swaged for mortise applications, inner leaf beveled, square cornered, unless manufacturer's recommendations indicate that half-mortise, half-surface, full-surface or other type should be used for the frame and door type or condition.
6. Hinge Pins: Except as otherwise specified, provide hinge pins as follows:
 - a. Pins: Stainless steel.
 - b. Exterior Doors: Non-removable pins.
 - c. Tips: Flat button and matching plug, finished to match leaves.
7. Product and Manufacturer: Provide one of the following:
 - a. FBB 179 by The Stanley Works.
 - b. Or equal.
8. Comply with UL, List of Inspected Fire Protection Equipment and Materials and NFPA No. 80 requirements.

C. Entrance Lock Sets:

1. Strikes: Provide manufacturer=s standard wrought box strike, at locations indicated in Hardware Schedule or as shown. Provide stainless steel curved lip strikes, unless otherwise recommended by manufacturer, finished to match lock or latch set trim.
2. Lock Throw: Provide minimum of 3/4-inch anti-friction latch bolt and 1-inch dead bolt throw wherever available on manufacturer=s functions specified. Comply with UL requirements for throw of latchbolts and deadbolts on rated fire openings.
3. Materials: Provide the following materials:
 - a. Latch Bolt: Extruded brass.
 - b. Dead Bolt: Forged brass.
 - c. Case: Cast iron with corrosion resistant finish, or heavy gage wrought brass.
 - d. Cylinders: Brass.
 - e. Scalp: Stainless steel, finished to match trim specified.
4. Backset: Provide minimum backset of 2 3/4-inches.
5. Trim Knob: Copenhagen, COE.

6. Finish: US 32D Satin.
 7. Product and Manufacturer: Provide one of the following:
 - a. Entrance Lock 5407 & 5401 series by Yale Security, Incorporated.
 - b. Or equal.
- D. Exit Devices: Provide exit devices on single doors and each leaf of the double doors at locations indicated in Hardware Schedule.
1. Exit Doors: Where required by governing regulations, provide panic exit devices, of the type required, including UL labels if required by governing regulations.
 2. Product and Manufacturer: Provide one of the following:
 - a. Model 1500 Type 1 by Yale Security, Incorporated.
 - b. Or equal.
- E. Cylinders and Keying System:
1. Standard System: Except as otherwise specified, provide new system for the Project.
 2. Equip all locks with manufacturer's special 6-pin tumbler cylinder, with construction master key feature, which permits voiding of construction keys without cylinder removal.
 3. Comply with the Owner's instructions for master keying and, except as otherwise specified, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.
 4. Key Material: Provide keys of nickel silver only.
 5. Key Quantity: Furnish 3 keys for each lock and 5 keys for each master and grandmaster system. Provide one extra key blank for each lock.
- F. Door Closers:
1. Provide all doors, both active and inactive, with door closers, unless otherwise specified.
 2. Size of Units: Except as otherwise specified, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather, and anticipated frequency of use.
 3. Where parallel arms are specified, and for closers on exterior doors, provide closer unit one size larger than recommended for use with standard arms.
 4. Use parallel arm arrangement for doors that would otherwise have the door closer appearing in finished corridors or entries.
 5. Comply with UL, Building Materials Directory, and List of Inspected Fire Protection Equipment and Materials, and NFPA No. 80 for doors requiring door closers. Modify closers specified as required.

6. Provide hold open feature for all non-fire rated doors unless otherwise specified.
7. Provide corner bracket mounting on exterior doors. Select all arms to clear weatherstripping, and overhead door holders.
8. Provide closers with spring power adjustment feature capable of increasing spring power 50 percent minimum in all closer sizes.
9. Provide closer with delayed closing action and hold open feature. Position valve at top of closer.
10. Provide individual regulating valves for closing and latching speeds, and separate adjustable backcheck valve.
11. Material: Provide the following materials:
 - a. Cover: Aluminum
 - b. Case: Cast Iron
 - c. Other Parts: Steel
12. Finish: US 32D Satin, anodized aluminum.
13. Product and Manufacturer: Provide one of the following:
 - a. 2300 series Door Closers by Yale Security, Incorporated.
 - b. Or equal.

G. Wall and Floor Stops:

1. All doors shall have stops. Provide wall stops for all interior doors wherever possible. Provide floor stops only where conditions preclude the use of wall stops.
2. Materials: Cast Iron.
3. Finish: US 32D Satin.
4. Provide concealed stainless steel fasteners as required by the substrate.
5. Coordinate height of dome type floor mounted doors stops with threshold condition and undercut of door.
6. Product and Manufacturer: Provide one of the following:
 - a. WB33X wall mounted concave series and FB26 floor mounted dome type series by Glynn Johnson Companies.

H. Stripping and Seals:

1. Provide perimeter weather stripping at all exterior doors and other doors as specified.

2. Continuity of Stripping: Except as otherwise specified, it is required that the stripping at each opening be continuous and without unnecessary interruptions at door corners and hardware.
3. Replaceable Seal Strips: It is required that the resilient or flexible seal strip of every unit be easily replaceable and readily available from stocks maintained by the manufacturer.
4. Provide bumper type weather stripping at jambs and head, including a resilient insert and metal retainer strip, surface applied, of the following metal, finish and resilient bumper material:
 - a. Housing: Extruded aluminum with anodized finish; 0.062 inch minimum thickness of main walls and flanges.
 - b. Seals: Closed cell extruded sponge neoprene.
5. Product and Manufacturer: Provide one of the following:
 - a. No. 59 by Reese Enterprises, Incorporated.
 - b. Or equal.
6. Provide automatic drop-seal sound-stripping door-bottom unit of manufacturer's standard design, with operating seal bar of the following material, retained in an extruded metal bar, and capable of operating to close a 3/4-inch gap (from door bottom to floor or threshold). House mechanism and operating bar in the following metal housing, for mounting on doors as follows:
 - a. Housing: Extruded aluminum, 0.062-inch thick, with medium bronze anodized finish on exposed surfaces.
 - b. Seal: Closed-cell sponge neoprene.
 - c. Mounting: Surface-mounted, except as otherwise indicated. Mount on stop-face of doors, except mount on hinge-face of swing-in exterior doors.
7. Product and Manufacturer: Provide one of the following:
 - a. No. 330A by Reese Enterprises, Incorporated.
 - b. Or equal.

I. Astragals:

1. Provide metal astragal bar, not less than 1/8-inch by 2-inches, for exposed flat head screw mounting on active leaf of pairs of doors. Comply with UL and NFPA requirements for locations of astragals.
2. Provide astragal of cold rolled steel, prime paint finish.
3. Product and Manufacturer: Provide one of the following:
 - a. Model No. 183SP by Reese Enterprises, Incorporated.
 - b. Or equal.

J. Thresholds:

1. Provide thresholds on all exterior doors and doors in walls forming hazardous spaces and as specified on Door Schedule.
2. Metal: Extruded aluminum, smooth commercial finish.
3. Surface Pattern: Grooved tread, manufacturer's standard.
4. Provide countersunk aluminum screws and expansion shields.
5. Width: 5 inches wide and full width of opening.
6. Construction: Single-piece, complying with manufacturer's recommendations.
7. Profile: Provide manufacturer's standard unit which conforms with the minimum size and profile requirements specified.
 - a. Floor Drop: Except where no change in floor elevation is shown (from inside to outside), provide profile which accommodates 2-inch drop in floor elevation, unless another dimension is shown.
 - b. For doors equipped with panic hardware, provide profile with stop bar of proper size and shape to function as the strike plate for the floor bolts.
8. Thickness: 1/8-inch minimum.
9. Product and Manufacturer: Provide one of the following:
 - a. 1665A by Pemko Manufacturing Company.
 - b. Or equal.

K. Silencers:

1. Provide silencers for all non-fire rated door frames.
2. Product and Manufacturer: Provide one of the following:
 - a. No. GJ64 by Glynn-Johnson.
 - b. Or equal.

L. Sealants: Provide butyl rubber sealant complying with FS TT-S-001657 for use with thresholds.

2.02 HARDWARE FINISHES

- A. Provide matching finishes for finish hardware units at each door or opening, to the greatest extent possible. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of finish hardware exposed at the same door or opening. In general, match all items to the manufacturer's standard finish for the latch and lock set for color and texture.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrate to receive finish hardware, and ascertain the conditions under which the work will be performed, and notify the Owner in writing of unsatisfactory conditions. Do not proceed with the finish hardware work until unsatisfactory conditions have been corrected in a manner acceptable to the Owner.

3.02 PREPARATION

- A. Templates: Furnish finish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of finish hardware. Upon request, check the shop drawings of such other work, to confirm that adequate provisions are made for the proper installation of the finish hardware.

3.03 INSTALLATION

- A. Mount finish hardware units at heights recommended in, "Recommended Locations for Builders' Hardware," by National Builders Hardware Association, except as otherwise specified or required to comply with governing regulations.
- B. Install each finish hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install finish hardware onto or into surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Cut and fit threshold and floor covers to profile of door frames, with mitered corners and hair-line joints. Join units with concealed welds or concealed mechanical joints. Cut smooth openings for spindles, bolts and similar items, if any.
- F. Screw thresholds to substrate with No. 10 or larger screws, of the proper type for permanent anchorage and of bronze or stainless steel which will not corrode in contact with the threshold metal.
- G. Set thresholds in a bead of butyl rubber sealant to completely fill concealed voids and exclude moisture from every source. Do not plug drainage holes or block weeps. Remove excess sealant.

3.04 ADJUSTMENT AND CLEANING

- A. Adjust and check each operating item of finish hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with the type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units which cannot be adjusted and lubricated to operate freely and smoothly as intended for the application.

- B. Final Adjustment: Where finish hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make a final check and adjustment of all finish hardware items in such space or area. Clean and relubricate operating items as necessary to restore proper function and finish of finish hardware and doors. Adjust door control devices to compensate for final operating of heating and ventilating equipment.
- C. Instruct Owner's personnel in proper adjustment and maintenance of finish hardware during the final adjustment of finish hardware.
- D. Finish hardware which is blemished or defective will be rejected even though it was set in place before defects were discovered. Remove and replace with new finish hardware. Repair all resultant damage to other work.
- E. Continued Maintenance Service: Approximately 6 months after the acceptance of finish hardware in each area, the installer, accompanied by the representative of the latch and lock manufacturer, shall return to the Project and re-adjust every item of hardware to restore proper function of doors and finish hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Clean and lubricate operational items wherever required. Replace finish hardware items which have deteriorated or failed due to faulty design, materials or installation of finish hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the finish hardware.

3.05 SCHEDULES

- A. Scheduled items for each door are generic and rely on information specified above. The listing of hardware types provided is only a general guideline for the final finish hardware schedule. Contractor shall submit a finish hardware schedule acceptable to all codes and testing agencies.
- B. Provide the following finish hardware types:

Hardware Set Type 1

1.	Lockset	5407
2.	Closer	2300

END OF SECTION

SECTION 09250

GYPSUM WALLBOARD

PART 1 GENERAL

1.01 SUMMARY

A. Scope:

1. Contractor shall furnish all labor, materials, equipment and incidentals required to provide gypsum wallboard as shown and specified. The Work also includes:
 - a. Providing openings in gypsum wallboard to accommodate the work under other contracts and assisting other contractors in building into the gypsum wallboard all items such as anchor bolts, inserts and all other items required to be embedded in gypsum wallboard under other contracts.
2. The extent of the gypsum drywall systems is shown on the Drawings and; is hereby defined to include all ceilings finish with gypsum board manufactured for direct application of decorative finishes, including a joint treatment system known as drywall finishing and other drywall trim systems.
3. The type of work required include the following:
 - a. Drywall system face-type gypsum board work

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the gypsum wallboard.
2. Notify other contractors in advance of the construction of the gypsum wallboard to provide the other contractors with sufficient time for the installation of items included in their contracts that must be installed with the gypsum wallboard.

C. Related Sections:

ROUGH CARPENTRY	Section 06100
PAINTING	Section 09900

1.02 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. FM Compliance: Comply with Approval Guide, for applicable fire- resistant constructions.

B. Allowable Tolerances: 1/8-inch offsets between planes of board faces, and 1/4 inch in 8 feet for plumb, level, warp and bow.

C. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. ASTM C 36, Gypsum Wallboard.

2. ASTM C 475, Joint Treatment for Gypsum Wallboard Construction.
3. ASTM C 36, Gypsum Wallboard and Type X.
4. ASTM C 646, Steel Drill Screws for Application of Gypsum Sheet Material to Light Gage Steel Studs.
5. ASTM E 84, Test Surface for Burning Characteristics of Building Materials.
6. ASTM E 119, Fire Tests of Building Construction and Materials.
7. Gypsum Association, GA-216, Application and Finishing of Gypsum Board.

1.03 SUBMITTALS

- A. Shop Drawings: Submit for approval copies of manufacturer's product specifications and installation instructions for gypsum drywall system required, including other data as may be required to show compliance with these specifications.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials:
 1. Deliver materials to the Project site with manufacturer's labels intact and legible.
- B. Storage of Materials:
 1. Store materials inside under cover, stack flat, off floor.
 2. Stack wallboard so that long lengths are not over short lengths.
 3. Avoid overloading floor system.

1.05 JOB CONDITIONS

- A. Environmental Requirements:
 1. Temperature: During cold weather, in areas receiving wallboard installation, maintain temperature range between 55 F to 70 F for 24 hours before, during and after gypsum wallboard and joint treatment application.
 2. Ventilation:
 - a. Provide ventilation during and following adhesives and joint treatment applications.
 - b. Protect installed materials from drafts during hot, dry weather.
- B. Protection: Protect adjacent surfaces against damage and stains.

PART 2 PRODUCTS

2.01 GYPSUM BOARD PRODUCTS

- A. Exposed Gypsum Board: Comply with ASTM C 36 for exposed gypsum board, hereby defined to include work indicated for painted finish in the chemical and pump room ceilings.
 - 1. Thickness: 5/8 inch.
 - 2. Sheet Size: 4 feet wide by maximum length available which will minimize the number of end joints in the work.
 - 3. Long-Edge Profile: Standard taper.
 - 4. Application: One layer.
- B. Exposed Fire Resistant Gypsum Board: Comply with ASTM C36 Type X for exposed gypsum board, hereby defined to include work indicated for painted finish in the Generator Room ceiling.
 - 1. Thickness: e inch.
 - 2. Sheet Size: 4 feet wide by maximum length available which will minimize the number of end joints in the work.
 - 3. Long Edge Profile: Standard taper.
 - 4. Application: Two layers.
- C. Product and Manufacturer: Provide products as manufactured by one of the following:
 - 1. Gypsum Wallboard and Firestop Gypsum Board Type X by Georgia Pacific Corp., Atlanta, GA.
 - 2. Or equal.

2.02 JOINT TREATMENT MATERIALS

- A. Joint Tapes: Plain or perforated complying with ASTM C 475.
- B. Joint compound: ASTM C 475 ready-mixed type adhesive ready for application.

2.03 TRIM ACCESSORIES

- A. General: Provide manufacturer's standard trim accessories for drywall work, formed of PVC for corner beads, L-type edge trim-beads.

2.04 MISCELLANEOUS MATERIALS

- A. Gypsum Board Fasteners: Comply with GA-216, and with gypsum board manufacturer's recommendations; choice is installer's option where more than one type is recommended for application specified.
 - 1. Screws, self-drilling, self-tapping, bugle head, for use with power driven tool.
 - a. Type W for wallboard to wood.

- b. Type G for wallboard to wallboard.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor and his installer shall examine the substrates and the spaces to receive gypsum drywall, and the conditions under which gypsum drywall is to be installed; and shall notify the Owner, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Owner.
- B. Check framing for accurate spacing and alignment.
- C. Verify that spacing of installed framing does not exceed maximum allowable for thickness of wallboard to be used.
- D. Verify that frames are set for thickness of wallboard to be used.
- E. Protrusions of framing, twisted framing members, or unaligned members shall be repaired before installation of wallboard is started.

3.02 INSTALLATION OF GYPSUM BOARD

A. Preparations and Coordination:

- 1. Pre-Installation Coordination: Prior to the start of installation of gypsum board, coordinate work requiring openings, chases, frames, access panels, support and similar integrated requirements, including heating and ventilating and electrical work.
 - a. Do not proceed with gypsum board installation until blocking, framing, bracing, furring and other supports for subsequently applied work have been installed.
 - b. Do not install gypsum board until insulation to be concealed by board has been installed.

B. General Installation Requirements:

- 1. Standards: Comply with GA-216 unless otherwise shown or specified. Comply with requirements for indicated fire- resistance ratings.
- 2. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 12 inches in alternate courses of board.
- 3. Install exposed gypsum board with face side out. Do not install imperfect damaged or damp boards. Butt boards together for a light contact at edges and ends with not more than 1/16-inch open space between boards. Do not force into place.
- 4. Locate either edge or end joints over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so that both tapered edge joints abut, and mill-cut or field-cut end joints abut. Do not place tapered edges against cut edges or ends.

5. Attach gypsum board to framing and blocking as required for additional support at openings and cutouts.
6. Do not locate joints within 8 inches of corners or openings, except where control joints are shown at jamb lines or where openings occur adjacent to corners in the partition/wall layout. Where necessary, place a single vertical joint over the center of wide openings.

C. Methods of Gypsum Drywall Installation:

1. General: In addition to compliance with the standards, comply with the specific requirements indicated for each type or arrangement of gypsum drywall system shown.
2. Single-Layer Ceilings: Apply exposed gypsum board on ceilings, before applications on walls and partitions, to the greatest extent possible.
 - a. Apply in direction which will minimize end joints.
 - b. Fasten with screws.
3. Double-Layer Ceilings: Install base layer of gypsum backing board or exposed type gypsum board, at installer's option, and then face layer of exposed gypsum board. Apply base layer before applications on walls and partitions, to the greatest extent possible, and apply at right-angles to support with end joints staggered over supports.
 - a. Apply sheets in direction which will minimize end joints.
 - b. Fasten with screws.

3.03 INSTALLATION OF DRYWALL TRIM ACCESSORIES

- A. General: Coordinate, and integrate where possible, the installation of trim accessories with the installation of gypsum board. Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports.

3.04 FINISHING

- A. General: Comply with manufacturer's instructions for the mixing, handling and application of materials. Machine or hand application is installer's option. Apply treatment at joints both directions, flanges of trim accessories, but not semi-finishing types, penetrations of the gypsum board, piping and similar work, fastener heads, surface defects and elsewhere as shown or specified. Apply in the manner which will result in each of these being concealed when applied decoration has been completed.
1. Where open joints of more than 1/16 inch occur, including edges of boards with rounded or beveled corners, prefill joint with special chemical-hardening-type bedding compound, prior to bedding of joint tape.
 2. Apply joint tape at joints between gypsum boards, except where a trim accessory is shown.
 3. Do not use topping compound for bedding the joint tape.

4. Apply joint compound in 3 coats, not including prefill or openings in base, and sand between last 2 coats and after last coat.

END OF SECTION

SECTION 09900

PAINTING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Paints and coatings for field application.
- B. Surface preparation, field and shop application of paints and coatings.
- C. Coordination of shop and field painting.

1.02. RELATED SECTIONS

- A. Section 04201 – UNIT MASONRY CONSTRUCTION
- B. Section 05500 - MISCELLANEOUS FABRICATIONS
- C. Section 08115 – HOLLOW METAL DOORS AND FRAMES: Field painting of shop primed items.
- D. Section 09250 – GYPSUM WALLBOARD
- E. Section 15060 – INSIDE PROCESS PIPING
- F. Section 15100 – INSIDE PROCESS VALVES AND HYDRANTS

1.03. 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
N.S.F. (National Sanitation Foundation)	

1.04. DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this section.

1.05. SUBMITTALS

- A. Submit painting experience record of proposed subcontractor/ Contractor for approval. List projects of similar size and type that have been successfully completed within the past five years. Pro
- B. Submit a complete schedule of paint systems and surface preparations proposed.
 - 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 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 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 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 on 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 systems for fabricated equipment.
- 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. Paint and paint products shall be as designated for the following uses and as manufactured by the following manufacturers or approved equal:
 - 1. Industrial/Commercial - Materials shall be products listed in this Section or equivalent as submitted per Section 01300, Submittals, and approved by Engineer.
 - 2. Wood Stains - Materials shall be as listed in this Section or equivalent as submitted per Section 01300, Submittals, and approved by Engineer.
- 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, 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 showing that substitute product(s) equal or exceed performance of specified products as tested according to:
 - a. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 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.

Products for each specified function and system shall be of a single manufacturer.

- 3. Where thinning is necessary, only the products of the particular manufacturer furnishing the paint shall be used and all such thinning shall be done in strict accordance with the manufacturer's instructions.
- 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 shall be used, and all such thinning shall be done in strict accordance with the manufacturer's instructions.

2.02. MATERIAL

- A. Paint - 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 (NSF) 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 facilities. Where laws or regulations prohibit field applications of any scheduled paint 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.

- 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. All surfaces to be painted shall be prepared with the objective of obtaining a clean and dry surface free from dust, rust, scale and all foreign matter. No painting shall be done before surfaces meet requirements of paint manufacturer.
- B. Hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place prior to cleaning and painting, and not intended to be painted, shall be protected or removed during painting operations and repositioned upon completion of painting operations.
- C. All surface preparations shall be in strict accordance with the recommendations of the paint manufacturer.
- D. Ferrous Metals
 - 1. All ferrous metal to be primed shall have all rust, dust, and scale removed by abrasive blast cleaning in accordance with SSPC (Steel Structures Painting Council) procedures designated in the Specifications or on Contract Drawings. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent rusting. If rusting beyond ASTM Rust Grade 8 occurs in the field, rusted portions of shop-primed ferrous metals shall be field-cleaned in accordance with SSPC blast cleaning specification appropriate for service and immediately field primed.
 - 2. All ferrous metals not primed in shop shall be abrasive blast cleaned to SSPC-SP10 Near White Blast or an SSPC-SP6 Commercial Blast, depending on exposure, prior to application of any primer, pretreatment, or paint.
- E. Nonferrous Metals - All nonferrous metals, whether shop or field primed, shall be solvent cleaned (SSPC-SP1) prior to application of primer. Galvanized steel surfaces scheduled for painting shall be uniformly abraded to create a surface profile of between 1.0 to 1.5 mils prior to the application of either the shop or field prime coat.
- F. Concrete - All concrete surfaces shall be cleaned of all dust, form oil, curing compounds, and other foreign matter before paints or coating are applied. Poured concrete and submerged surfaces to be painted shall be prepared using the following method:
 - 1. Blasting - Abrasive blast-cleaning of concrete shall be performed in accordance with SSPC-SP13 Standard and sufficiently profiled in accordance with ICRI Concrete Surface Profile Standards as required by the coatings manufacturer. Care shall be taken during blasting that concrete is not eroded unnecessarily.
 - a. Dry abrasive blasting equipment with a compressed air blast nozzle shall be used for blasting concrete. After blast cleaning is completed, abrasive dust and loose particles shall be removed from surface by vacuuming and blowing off with high pressure air. Voids and cracks that will cause discontinuities in coatings or unsightly appearance shall be patched.
 - b. All drains subject to abrasive spray, shall be plugged prior to blasting. After blasting is completed, all abrasive shall be removed from area prior to opening drains. Under no circumstances shall abrasive be allowed to enter drains.

- G. Wood - Wood surfaces shall be thoroughly cleaned and free of all foreign matter, with cracks, nail holes and other defects properly filled and smoothed. Wood trim shall be sandpapered lightly when dry, before a second coat of paint or stain is applied. All wood trim shall be primed and backprimed before being set in place; all end grain and cut wood shall be thoroughly saturated with sealer before priming. After the prime coat on woodwork has dried, all nail holes, cracks, open joints, and other small holes shall be filled neatly with approved spackling putty. Exposed nails and other ferrous metals on surfaces to be painted with water-thinned paints shall be spot primed with aluminum paint.
- H. Prior Coating - Old paint surfaces on concrete, ferrous metal, and nonferrous metal shall be prepared by abrasive blast cleaning in accordance with proper SSPC method for the service.
- I. Touchup - Any abraded areas of shop or field applied coatings shall be touched up with the same type of shop or field applied coating, even to the extent of applying an entire coating, if necessary. Touchup coatings and surface preparations shall be in addition to and not considered as the first field coat.
- J. Castings (cast ferrous and nonferrous metals) - Surfaces of castings shall be prepared for painting by using a brush-applied filler and/or knife-applied filler, as required. These fillers are not to be used to conceal cracks, gasholes, or excessive porosity. Casting shall receive one coat of primer with a minimum thickness of 2 mils. Sufficient drying time must be allowed before further handling.
- K. Masonry - All masonry to be painted shall receive dampproofing, water repellent treatment, filler or protective coatings, depending upon exposure.
- L. Gypsum Board and Plaster - All gypsum board and plaster surfaces shall be sanded to remove rough edges and protrusions. Paint shall not be applied to plaster surfaces until surfaces have aged the minimum period of time prescribed by paint manufacturer supplying paint for this application. Before painting, such surfaces shall be dry, clean and free from grit, loose plaster and surface irregularities. Cracks and holes shall be repaired with approved patching materials, properly keyed to existing surfaces and sandpapered smooth.

3.03. APPLICATION

- A. Contractor shall be responsible for cleanliness of all painting 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 paint 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 paint shall be carefully removed without damage to finished paint or surface. If damage does occur, the entire surface adjacent to and including damaged area shall be repainted without visible lap marks.
- D. Do not use plumbing fixtures or waste piping for mixing of paint or disposal of any refuse material. All waste shall be disposed of properly into a suitable receptacle located outside of building.
- E. All paint shall be applied without runs, sags, thin spots, or unacceptable marks. Paint shall be applied at the rate specified to achieve minimum dry mil thickness required. Additional coats of paint 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 coats of paint 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 painting 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 plant piping, in accordance with Table A-3, Piping Color and Label Schedule. Plant piping shall be painted solid colors unless otherwise specified.
- J. On piping designated to receive identification bands, such band shall be 6 inches wide, neatly made by masking, and spaced at intervals of 30 inches on center, regardless of diameter of pipe being painted. Use approved precut and prefinished metal or plastic bands on piping in lieu of marked and painted bands, if approved by Engineer. PVC pipe shall be banded with colored bands in lieu of painting.
- K. Apply identification labels to all types and sections of piping, as outlined herein. Such labels shall be in form of plain Gothic Capital, upper case block lettering giving name of pipe content in full and showing direction of flow by arrows. Arrow to match letter type and size. All lettering shall have an overall height in inches, in accordance with the following table:

Diameter of Pipe or Pipe Covering	Height of Lettering
3/4 to 1-3/8 inches	1/2 inch
1-1/2 to 2-3/8 inches	3/4 inch
2-1/2 to 7-7/8 inches	1-1/2 inches
8 to 10 inches	2-1/2 inches
Over 10 inches	3 inches

- L. Piping labels shall be located as follows:
 - 1. Adjacent to each valve and fitting (except at pump suction and discharge connections where labels are required on headers only).
 - 2. At each branch and riser take-off.
 - 3. At each pipe passage through wall, floor or ceiling.
 - 4. Maximum distance between labels shall be 10 feet on all non-potable water, chemical piping, and on all chlorine solution lines with a minimum of two labels in each room, gallery, or tunnel. Maximum distance between labels on all other piping runs shall be 20 feet.
- M. Identification lettering shall be located midway between color coding bands where possible and shall be properly inclined to pipe axis to facilitate easy reading. In the event lettering and arrow identifications are required for piping less than 3/4-inch in diameter, the Contractor shall furnish and attach approved color coded tags where instructed.

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, shall receive at factory at least one shop coat of approved prime paint 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 begins so that work shall be equal to original painting at shop. Equipment or steel work that is to be assembled on the site shall likewise receive a minimum of one shop coat of paint 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 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 coat 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 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. Each field coat of priming and finishing paint shall be inspected by the Engineer or his authorized representative before the succeeding coat is applied. The Contractor shall follow a system of tinting successive paint coats 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. SHOP PAINTING

- A. Shop painting 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.

3.07. DESCRIPTION OF WORK

- A. The Interior and Exterior Coating System Schedules (Table A-1) and Piping Color and Label Schedule (Table A-3) are not intended to list every structure or equipment item to be painted or labeled. All new and existing structures, equipment, and appurtenances including all items furnished under the contract shall be painted by the Contractor, in accordance with the most applicable category from Table A-1.
 - 1. For application and curing of epoxy products at temperatures of 35 to 50 degrees F, use N69F Hi-Build Epoxoline II in lieu of N69 Hi-Build Epoxoline II and N140F Pota-Pox Plus in lieu of N140 Pota-Pox Plus.

TABLE A-1**COATING SYSTEM SCHEDULE**

Non-Submerged Concrete Walls and Ceilings – Interior (paint only when scheduled in Table A-2 or on the architectural drawings)

SYSTEM C-1	SHERWIN-WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	Clean and dry	Clean and dry	Clean and dry	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	--	--	--	--
Intermediate coat	Dura-Plate 235 3.5-5.0 mils/coat	Amerlock 2/400	Series N69 Hi-Build Epoxoline II 3.5-5.0 mils/coat	--
Finish coat	Dura-Plate 235 3.5-5.0 mils/coat	Amerlock 2/400	Series N69 Hi-Build Epoxoline II 3.5-5.0 mils/coat	Total DFT – 8. mils, minimum

Concrete Block, Open Porous or Rough Masonry - Interior

SYSTEM C-3	SHERWIN-WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	Brush down with stiff bristle broom. Clean and dry.			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	Dura-Plate 235 3.0-5.0 mils	Amerlock 2/400	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Dura-Plate 235 3.0-5.0 mils	Amerlock 2/400	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT – 16 mils minimum

General Ferrous Metal - Interior

SYSTEM M-2	SHERWIN-WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	Shop
Prime coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	Shop
Intermediate coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT – 12 mils minimum

TABLE A-1 (continued)

Submerged Ferrous Metal

SYSTEM M-3	SHERWIN-WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP10 / NACE No.2 Near white blast	SSPC-SP10 / NACE No.2 Near white blast	SSPC-SP10/NACE No.2 Near white blast	--
Prime coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	Shop
Intermediate coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT – 12 mils minimum

General Ferrous Metal - Exterior

SYSTEM M-4	SHERWIN-WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	Shop
Prime coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	Shop
Intermediate coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Acrolon 218 HS Polyurethane Semi-Gloss B65W00651	Amercoat 450H	Series N75-Color Endura-Shield II 2.0-3.0 mils	Total DFT – 10.5 mils minimum

Ferrous Metal – Below Grade

SYSTEM M-5	SHERWIN-WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	SSPC-SP6/NACE No.3 Commercial Blast Cleaning	--
Prime coat	--	--	--	--
Intermediate coat	--	--	--	--
Finish coat	Hi Mil Sher-Tar Coal Tar Epoxy B69B00040	Amercoat 78HB	46H-413 Hi-Build Tneme-Tar 16.0-20.0 mils	Total DFT – 16.0 mils minimum

TABLE A-1 (continued)

Uncertain Base Coat

SYSTEM M-8	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning & SSPC-2 Hand tool cleaning	SSPC-SP1 Solvent cleaning & SSPC-2 Hand tool cleaning	SSPC-SP1 Solvent cleaning & SSPC-2 Hand tool cleaning	Remove grease and oil. Scuff sand to dull gloss.
Prime coat	Corothane 1 Galvapak One Pack Zinc B65G00011	Amercoat 68MCZ	Series 1 Omnithane 2.5-3.5 mils	Follow with appropriate system for exposure.
Intermediate coat	--	--	--	Delete normal specified primer. Provide specified intermediate and finish coats
Finish coat	--	--	--	--

Aluminum Surfaces in Contact with Concrete

SYSTEM M-9	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning	SSPC-SP1 Solvent cleaning	SSPC-SP1 Solvent cleaning	--
Prime coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--.
Intermediate coat	--	--	--	--
Finish coat	--	--	--	Total DFT – 5.0 mils minimum

Nonferrous Metal - Interior

SYSTEM M-12	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent Cleaning	SSPC-SP1 Solvent Cleaning	SSPC-SP1 Solvent Cleaning	--
Prime coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--	--	--
Finish coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT – 8.0 mils minimum

TABLE A-1 (continued)

Nonferrous Metal - Exterior

SYSTEM M-13	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent Cleaning	SSPC-SP1 Solvent Cleaning	SSPC-SP1 Solvent Cleaning	--
Prime coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--	--	--
Finish coat	Acrolon 218 HS Polyurethane B65W00651	Amercoat 450H	Series 1075-Color Endura-Shield II 2.0-3.0 mils	Total DFT – 6.5 mils minimum

Galvanized Steel - Exterior

SYSTEM M-14	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP7/NACE No. 4 Brush-off Blast Cleaning	SSPC-SP7/NACE No. 4 Brush-off Blast Cleaning	SSPC-SP7/NACE No. 4 Brush-off Blast Cleaning	--
Prime coat	Corothane 1 Gal-Va-Pac Zinc Primer B65G00010	Amercoat 68MCZ	90-97 Tneme-Zinc 2.5-3.5 mils	--
Intermediate coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Acrolon 218 HS Polyurethane B65W00651	Amercoat 450H	Series 1075-Color Endura-Shield II 2.0-3.0 mils	Total DFT – 6.5 mils minimum

Galvanized Steel - Interior

SYSTEM M-15	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning to remove soluble contaminants. SSPC-SP3 Power tool cleaning to remove insoluble contaminants.	SSPC-SP1 Solvent cleaning to remove soluble contaminants. SSPC-SP3 Power tool cleaning to remove insoluble contaminants.	SSPC-SP1 Solvent cleaning to remove soluble contaminants. SSPC-SP3 Power tool cleaning to remove insoluble contaminants.	--
Prime coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--	--	--
Finish coat	Dura-Plate 235 B67W00235	Amerlock 2/400	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT – 8.0 mils minimum

TABLE A-1 (continued)

Gypsum Board or Plaster Walls, Ceilings and Soffits – Interior/Exterior

SYSTEM G-1	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	Clean and dry	Clean and dry	Clean and dry	--
Prime coat	DTM Acrylic Primer/Finish	Amercoat 220P	Series 6 Tneme-Cryl 2.0-3.0 mils	--
Intermediate coat	--	--	--	--
Finish coat	DTM Acrylic Primer/Finish	Amercoat 220P	Series 6 Tneme-Cryl 2.0-3.0 mils	Total DFT – 5.0 mils minimum

Natural Wood - Interior

SYSTEM W-1	SHERWIN WILLIAMS	PPG		REMARKS
Surface preparation	Clean and Dry	Clean and Dry	Clean and Dry	--
Prime coat	--	--	Varmor CF	--
Intermediate coat	Minwax High-Build Polyurethane Satin 710920000	Olympic Polyurethane Satin 43886	Varmor CF Satin	--
Finish coat	Minwax High-Build Polyurethane Satin 710920000	Olympic Polyurethane Satin 43886	Varmor CF Satin	Total DFT – 6.5 mils minimum

Wood – Painted – Exterior

SYSTEM W4	SHERWIN WILLIAMS	PPG	TNEMEC	REMARKS
Surface preparation	Clean and Dry	Clean and Dry	Clean and Dry	--
Prime coat	Exterior Oil-based Wood Primer Y24W8020	Seal Grip 17-941NF	Series 151-1051 Elasto-Grip PC	--
Intermediate coat	DTM Acrylic Primer/Finish B66W00001	Amercoat 220P	Series 6-Color Tneme-Cryl 2.0-3.0 mils	--
Finish coat	WoodScapes Exterior Polyurethane Semi-Transparent Stain A15T5	Amercoat 220 P	Series 6-Color Tneme-Cryl 2.0-3.0 mils	Total DFT – 7.5 mils, minimum

TABLE A-2

EQUIPMENT FINISH SCHEDULE

BUILDING NAME	ITEM NAME	PAINT SYSTEM NO.	COLOR
Building Addition	Magnetic flow meters	Do not paint	--
	UV reactors	Do not paint	--
	Electric valve actuators	Do not paint	--
	Wall sleeves (interior portion only)	M-5	Black
	Interior galvanized steel pipe supports	M-15	Grey
Pump Station	Booster pumps (do not paint motors)	M-2	Olive Green
	Interior galvanized steel pipe supports	M-15	Grey
	Concrete equipment/housekeeping pads	C-1	Safety Yellow

TABLE A-3

PIPING COLOR AND LABEL SCHEDULE

LEGEND	PIPING NOS. FROM DRAWINGS	LABEL COLOR	PIPE COLOR ^(1,2)	PAINT SYSTEM NO. ⁽³⁾	NOTES
Raw Water	1	Green with White letters	Olive Green	M-2	Piping located upstream of UV reactor
UV Treated Water	2	Blue with White letters	Dark Blue	M-2. Do not paint PVC	Piping located downstream of UV reactor
Drain	3	None	--	None	
Analyzer Supply	4	Blue with White letters	--	None	Label: "Analyzer Sample"
Natural Gas	5	⁽³⁾	Red ⁽³⁾	M-2	
Sodium Hypochlorite	6	Yellow with Black letters	--	None	
UVT Analyzer Supply	7	Green with White letters	--	None	Label: "Analyzer Sample"
Vent	8	None	-	None	
Existing Pump Suction Piping		Green with White letters	Olive Green	M-2	Remove existing coatings, rust, etc. per SSPC-SP6. Label "Raw Water"

(1) Pipe color and labels shall be in accordance with the NYS Fuel Gas Code.

(2) Submit manufacturer's color swatch for Engineer approval.

(3) For all piping identified, paint complete piping, fittings, and valves.

PAINT SCHEDULE

Reviewed by Paint Mfg. Rep. _____

Interior or Exterior Surfaces to Be Painted and Major Equipment	Surface Preparation		Paint System	Prime Coat Product, No. of Coats, Dry Film Thickness, and Coverage	Intermediate Coat	Finish Coat	Painting Status	Remarks (Any Special Treatment or Application Requirements)
	Shop	Field		Color	Color	Color		

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 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. RELATED SECTIONS

- A. Section 01600 - MATERIALS AND EQUIPMENT

1.03. 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.

1.04. 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 2010 Building Code of New York State.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in accordance with Section 01600.
- B. Store and protect products in accordance with Section 01600.
- C. Sign packages shall have exterior labels indicating the name of the building(s) where they are to be installed.
- D. Store adhesive or tape materials at temperatures within the manufacturer's recommended installation temperature range.

1.06. 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. 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. 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. Or equal.
- D. Instructional Signs
 - 1. Interior and exterior wall-mounted fiberglass signs.
 - 2. Best Sign Systems, Inc., Montrose, CO.
www.bestsigns.com (800) 235-2378
 - 3. Apco Signs, Atlanta, GA.
www.apcosigns.com (877)988-2726
 - 4. Or equal.

2.02. SIGNS

A. 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.

B. 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.

C. 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 plum 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.

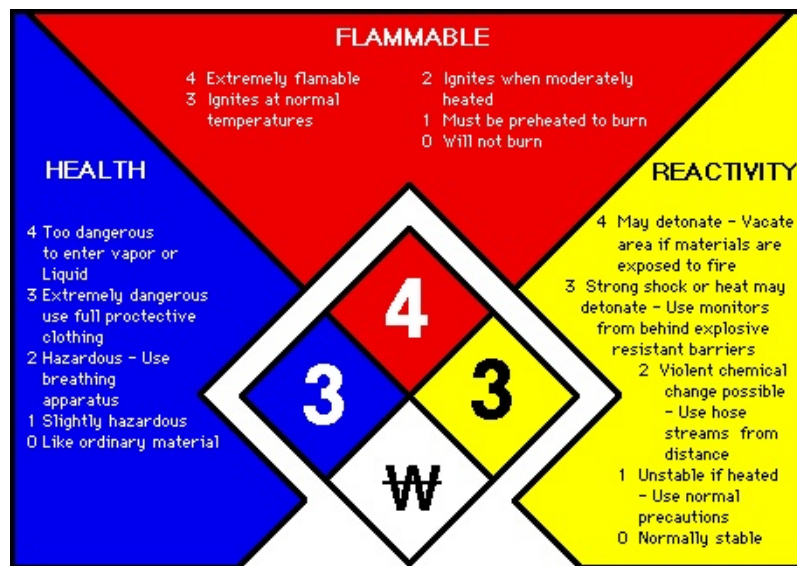
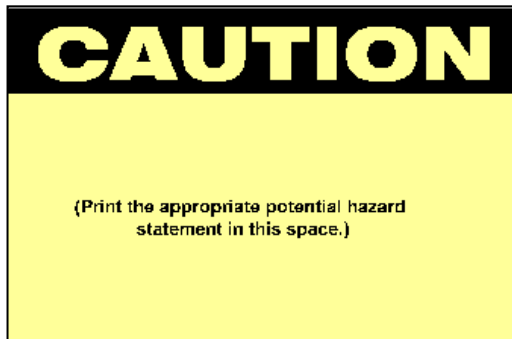
3.02. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install signs after doors and surfaces are finished.
- C. 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.
- D. 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. Provide red "NON-POTABLE WATER - DO NOT DRINK" safety signs at the following locations:
 - 1. Hose bibbs.
 - 2. Sample sink.
- B. Equipment Designation Signs - Provide self-adhesive, flexible vinyl equipment designation sign on or adjacent to each major equipment item and control valve shown on the Contract Drawings. Sign shall have full name of equipment and equipment I.D. both stated (i.e., Chemical Feed Pump CFP-1). Submit proposed names to Owner for approval prior to purchase.
- C. Provide "SAFETY GLASSES REQUIRED" safety signs at the following locations:
 - 1. Chemical feed pumps.
- D. Emergency Safety Eyewash – Provide OSHA-approved identification sign at each unit.
- E. Fire Extinguisher – Provide identifying sign at each unit.
- F. Chemical Health Hazard Designation Signs - Provide colored signs with chemical name, concentration, and four-component NFPA rating system at each chemical storage 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.
- G. Provide red "EXIT" signs above inside face of each exterior door in existing pump station and new UV Room. Signs shall be luminous (glow-in-the-dark).

3.04. FIGURES



END OF SECTION

SECTION 11300
PUMPING EQUIPMENT-GENERAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Gauges on suction and discharge sides of pumps.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01640 - EQUIPMENT-GENERAL
- C. Section 15060 – INSIDE PROCESS PIPING

1.03. SUBMITTALS

- A. Shop Drawings - Submit in accordance with Section 01300 for gauges.

PART 2 PRODUCTS

2.01. GAUGES

- A. Gauges shall be installed on the suction and discharge sides of pumps in accordance with the following specifications.
 - 1. Gauges shall be of the bourdon tube type with 4-1/2-inch diameter dial and with diaphragm seal.
 - 2. Case and ring shall be black epoxy coated aluminum, bourdon tube shall be phosphor bronze with a brass tip and window shall be glass.
 - 3. Gauges shall be stem mounted and shall be installed where shown on the Contract Drawings.
 - 4. Gauges shall be calibrated to read zero at atmospheric pressure.
 - 5. The suction gauges shall be of the compound type to indicate both pressure and vacuum; they shall be calibrated to read from 30 inches of mercury below 0 up to 100 psi.
 - 6. Pressure gauges shall be calibrated to read 0 to 200 psi.
 - 7. Gauges shall be Ashcroft No. 1379A (pressure) and No. 1379AC (suction); U.S. Gauge; or equal.
 - 8. All gauges shall have continuous duty, clamped Teflon diaphragm seals as manufactured by Ashcroft, Type 300; U.S. Gauge; or equal.
 - 9. Each diaphragm seal shall have Type 316 stainless steel upper and lower housings.

10. The lower housing shall be a threaded connection.
11. Gauges and diaphragm seals shall be by same manufacturer and shall be shipped as complete units, factory filled with silicone fluid.
12. Each gauge and diaphragm seal unit shall be connected with the necessary brass pipe fittings and a brass stopcock.

PART 3 EXECUTION

3.01. INSTALLATION OF EQUIPMENT

- A. Install gauges in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 11348

LIQUID CHEMICAL FEED SYSTEMS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Provide a pre-engineered chemical feed pump mounting skid for the existing chemical feed pumps, complete with all necessary piping, valves, accessories, and fittings required to feed the specified chemicals at the specified pressure and rate. General Contractor shall review and coordinate all sections listed in Article 1.02 to provide a fully functioning system as specified.
- B. Relocate the existing two chemical feed pumps to the new pump mounting skid.
- C. Provide the services of an authorized representative to perform calibration and initial field testing of the complete skid, including pumps.

1.02. RELATED SECTIONS

The specification sections listed below are an integral part of this equipment specification, and the Contractor shall be responsible for providing these sections to the equipment suppliers.

- A. Section 01300 - SUBMITTALS
- B. Section 01640 - EQUIPMENT-GENERAL
- C. Section 01660 - TESTING AND STARTUP
- D. Section 01700 - RECORD DOCUMENTS
- E. Section 09900 - PAINTING
- F. Section 10441 - SIGNS
- G. Section 15060 - INSIDE PROCESS PIPING
- H. Section 15100 - INSIDE PROCESS VALVES AND HYDRANTS

1.03. PERFORMANCE REQUIREMENTS

- A. All chemical feed systems shall be capable of continuous accurate feeding within ± 1 percent at any setting of liquid chemical solution to the application points as shown on the Contract Drawings.
- B. Chemicals to be handled by the systems and their properties are as follows:

Item	Sodium Hypochlorite
Chemical formula	NaOCl
Strength	12.5 to 15 percent
Density lb/gal / S.G.	10.0 / 1.2
Temperature	Up to 80 degrees F

1.04. EXISTING EQUIPMENT

- A. The two existing chemical feed pumps are Pulsafeeder PULSAtron, Series MP, Model LMD4TA-VTC1-500.
- B. Pump mounting skid shall be designed to mount the existing two chemical feed pumps.

1.05. SUBMITTALS

- A. Skid Layout Drawings - General Contractor shall provide detailed piping, valve, and accessory layout drawings for each chemical feed system. Drawings shall be based on the chemical feed schematics and piping layouts shown on the Contract Drawings.
- B. Shop drawings in accordance with Section 01300.
- C. Manufacturer's installation instructions and test results in accordance with Sections 01300 and 01640.
- D. Certification of Chemical Compatibility - Certify that all supplied equipment and components are compatible with specified chemicals.

1.06. SPARE PARTS AND PUMPS

- A. Provide the following replacement items for each chemical specified:
 - 1. One pressure relief valve.
 - 2. One vacuum breaker/anti-siphon valve.
 - 3. One sight glass.
 - 4. One calibration column.

Attach pipe and unions to these replacement items where applicable so that the items can be easily inserted into the piping network as constructed.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Pre-engineered Pump Mounting Skid
 - 1. Pulsafeeder, Model PES2C.
 - 2. Or equal.

2.02. PRE-ENGINEERED PUMP MOUNTING SKID

- A. Pump mounting skid shall be pre-engineered to mount two chemical feed pumps and provide all piping, valves, accessories, and fittings necessary for the calibration, operation, and maintenance of the pumps.
- B. Pump mounting skid shall include a mounting panel constructed of UV-stabilized HDPE which shall include a minimum 1-inch deep drip tray under all components of the skid.

- C. Skid shall provide two pump mounting bases compatible with the existing pumps.
- D. All piping shall be Schedule 80 PVC construction. Solvent cement shall be compatible with the chemicals specified herein.
- E. Pump mounting skid shall be designed and piped for two pumps with redundant piping and accessories. The suction and discharge connections shall be interconnected such that the skid provides a single suction connection and a single discharge connection for both pumps.
- F. The skid shall include the following features:
 - 1. Common suction piping connection with isolation valve.
 - 2. Common discharge piping connection with isolation valve.
 - 3. Pulsation dampener for each pump.
 - 4. Calibration column for each pump.
 - 5. Wye-strainer on the suction connection.
 - 6. Pressure relief valve for each pump, which shall discharge back to the suction side of the pump. Discharge side of pressure relief valve shall be provided with a sight glass, located in a convenient location for visual inspection. Initial pressure relief setting shall be 130 psi.
 - 7. Discharge pressure gauges for each pump.
 - 8. Back pressure sustaining valve for each pump.
 - 9. Air bleed valve for each pump.
 - 10. All isolation valves required to isolate each pump, gauge, and accessory, and operate each calibration column.
- G. Pipe, valve, and accessory diameters shall be sized for the maximum flow rate of the existing pumps and shall be rated for a maximum pressure of 150 psi. Normal operating pressure at chemical feed point will be 120 psi.
- H. Chemical supply will provide a normally flooded suction, however, certain conditions may require a suction lift. The minimum chemical liquid level is 8 inches above the bottom of the pump mounting skid.
- I. The skid shall be designed to be floor mounted on a concrete pad as shown on the Contract Drawings.

2.03. ACCESSORIES

- A. Calibration Column - A pump calibration column shall be supplied with the chemical feed systems as shown on the Contract Drawings and shall be fabricated out of clear, high-impact, Grade 1 PVC. The scale shall be calibrated in milliliters and fluid ounces and shall have a capacity to feed the pump for 1 minute or more at 100 percent setting. Shall be Koflo or equal.

- B. Valves and Fittings - Backpressure, pressure relief, and ball valves shall be furnished and installed as shown on the Contract Drawings and as specified. Wye strainers shall be clear PVC and shall be provided as shown on the Contract Drawings.

All pressure relief and feed lines shall be provided with a sight glass as shown on the Drawings. All sight glasses shall be mounted at a convenient location for visual inspection.

All valves and fittings shall be in full compliance with Sections 15060 and 15100 and shall be manufactured by Plast-O-Matic, Hayward, ASAHI, or equal.

- C. Chemical Injectors - Solution piping shall terminate in a section of 3/4-inch clear flexible braided PVC tubing, compatible with the chemical and as specified in Section 15060, and a new chemical injector (unless otherwise indicated) at the location shown on the Contract Drawings. Injector shall be 3/8-inch, made of chlorinated PVC construction, designed for chemical solution piping and resistant to specified chemical strength. They shall be removable without dewatering. Connection shall be male NPT. Tubing length shall be sufficient to remove injector. Injector shall be installed in accordance with manufacturer's recommendations.

Chemical injector shall include a heavy duty corporation stop, a CPVC solution tube assembly with ball check valve, shutoff valve, and safety chain, and shall be Safe-T-Flo Model EB-131 or equal. All injection points shall be installed utilizing a service saddle. Service saddle shall be coated iron with stainless steel straps. Quills shall extend into the pipe 6 inches.

- D. Piping - All system piping materials and sizes shall be as specified in Section 15060 and as shown on the Contract Drawings.
- E. Gauges on chemical feed systems shall be scaled from 0 to 150 psi and shall be provided with PVC gauge guards with viton diaphragms as manufactured by Plast-O-Matic, Hayward, or equal.

2.04. SIGNAGE

- A. General Contractor shall label piping in accordance with Section 09900.
- B. General Contractor shall provide equipment nameplates in accordance with Section 01640.
- C. General Contractor shall provide engraved PVC plaques indicating pump designation for each pump provided in accordance with Section 10441.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. The equipment shall be installed in accordance with the manufacturer's recommendations, as outlined in the Contract Drawings, and in accordance with Section 01640.

3.02. FIELD TESTING AND INITIAL OPERATION

- A. System shall be field tested in accordance with Sections 01640 and 01660. Calibration curves for feed pumps shall be determined under actual field operating conditions. Calibration curves shall be provided to cover pump operating ranges including 10, 50, and 100 percent capacity under actual measured discharge pressure conditions.

- B. Final field acceptance test for each system shall prove system's capability to meter the chemical solution.

3.03. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Provide manufacturer's (or supplier's) services according to Section 01640.

END OF SECTION

SECTION 11390

ULTRAVIOLET DISINFECTION EQUIPMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Furnish all labor, materials, equipment and appurtenances required to provide a closed vessel, pressurized flow, ultraviolet (UV) disinfection system complete with an automatic or mechanical/chemical cleaning system, electronic or electromagnetic ballasts/power supply or constant wattage transformers (CWTs), programmable logic controller (PLC)-based control equipment and accessories in compliance with the following specifications. Disinfection system shall be capable of disinfection of unfiltered water for public consumption. The system shall consist of equally sized parallel reactors in a N+1 configuration and all associated controls.
- B. The UV system shall be furnished with all necessary equipment including but not limited to the UV reactors, UV duty sensors, UV reference sensor, the UV lamp assemblies, power distribution centers, system instrumentation and controls, automatic quartz sleeve mechanical or mechanical/chemical cleaning system, ballasts, CWT, power supply cooling system, and all control equipment and accessories specified herein.

1.02. QUALITY ASSURANCE

- A. The UV manufacturer shall have a minimum of five years' operational experience in the design and manufacture of UV systems with a proven track record of at least five installations in North America, each with a flow rate of at least 0.5 U.S. mgd. The manufacturer shall provide documentation of their experience with UV disinfection systems in municipal drinking water applications.
- B. The UV manufacturer shall submit a Bioassay Validation Report for the proposed reactor. The report shall include detailed information regarding the installation configuration(s) for which the reactor is validated. The bioassay testing and results shall have been validated by a qualified independent third party in full compliance with EPA 815-R-06-007, *Ultraviolet Disinfection Guidance Manual (USEPA UVDGM) For The Final Long Term 2 Enhanced Surface Water Treatment Rule*, released November 2006. Validation Report shall include MS2 phage and T1 phage. Acceptance of the UV equipment manufacturer shall be contingent upon New York State Department of Health (NYSDOH) acceptance of the UV reactor validation.
- C. The bioassay testing must encompass the range of design and operating conditions described herein.
- D. Bioassay testing shall also verify that the maximum headloss generated by the proposed reactor is less than or equal to the specified limits.
- E. Shop drawing submittals from the UV manufacturer shall include a complete and detailed proposal of equipment offered, including a Bill of Materials, the number of lamps proposed, cut sheets of equipment, and a detailed description of any exceptions taken to the specification.
- F. The UV manufacturer shall submit documentation of service capabilities, including location and experience.

- G. The Validation Report cannot contain any restrictions in use by the Owner or Engineer.

1.03. DESIGN REQUIREMENTS

A. Design Criteria

1. The UV manufacturer shall provide equipment with the following characteristics:
 - a. Peak (Design) Flow Rate - 480 gpm (with one unit out of service).
 - b. Average Flow Rate – 350 gpm
 - c. Average Daily Treatment Volume - 280,000 gallons per day.
 - d. Minimum Flow Rate - 220 gpm.
 - e. Log *Cryptosporidium* Inactivation - 2.0 (based on MS2 phage).
 - f. Log *Giardia* Inactivation - 3.0 (based on MS2 phage).
 - g. Quantity - No more than two reactors shall be provided.
 - h. Design UV Transmittance (UVT) - 87 (at 254 nm).
 - i. Average Operating UVT - 91 percent (at 254 nm).
 - j. Redundancy - N+1, parallel trains, no units in series.
 - k. Maximum Inlet Pressure - 150 psig.
 - l. Maximum Reactor Flange Diameter - 8 inches.
 - m. Maximum Allowable Reactor Headloss Through Any Single Reactor at Any Operating Condition - 2.5 inches H₂O.
2. Design Dose
 - a. The UV disinfection system shall be designed to deliver the Reduction Equivalent Dose (RED) specified below in paragraph 1.04.F. To ensure the UV system can deliver the RED at the end of lamp life, with fouled sleeves, the RED shall incorporate a Combined Aging and Fouling Factor (CAF) calculated as $CAF = EOLL \times FF$, where EOLL (End Of Lamp Life) is the ratio of the lamp output at the end of the lamp life relative to the new lamp output, and FF is the Fouling Factor. The FF shall be 0.90 for UV systems with on-line mechanical sleeve wiping system, or 0.94 for UV systems with an on-line combined chemical and mechanical sleeve wiping system. EOLL output shall be no greater than 80 percent of the specified new lamp output. A higher value shall be permitted only if the manufacturer provides a validation report showing that the EOLL output has been validated by third-party witnessed testing of the output at the end of the warranted lamp life in accordance with the requirements of the UVDGM.
 - b. The RED shall be delivered under the peak (design) flow rate and the full range of design UVT conditions specified in paragraph 1.03.A.1 with only duty reactors in service.

- c. RED must be verified by third party witnessed bioassay testing per paragraph 1.02.B.
- B. System Components - The UV system shall be comprised of the following components:
 - 1. UV Reactors - N+1 (duty plus one standby).
 - 2. Control Power Panels - One per reactor.
 - 3. UV Intensity Sensors – One per lamp (Type A), 1 per 10 lamps (Type B).
 - 4. Automatic Cleaning System - On-line mechanical (Type A) or on-line chemical/mechanical (Type B).
 - 5. Required accessories and spare parts.

1.04. PERFORMANCE AFFIDAVIT

- A. Provide performance affidavits for products as required herein.
- B. By these affidavits, the manufacturer must certify to the Contractor and the Owner, jointly, that he has examined the Contract Documents and that the equipment, apparatus, process or system he offers to furnish will meet in every way the performance requirements set forth in Section 11390 of the Contract Documents. 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 Pre-Selection Documents."

Signature: Corporate officers shall be vice president or higher (unless statement authorizing signature is attached).

Notary: Signature(s) must be notarized.

- F. Performance Requirements

- 1. The UV manufacturer shall provide a written guarantee that the equipment will meet the specified performance requirements for each unit. The UV disinfection system shall be capable of providing and documenting 2-log of *cryptosporidium* and 3-log of

giardia inactivation at the peak (design) flow and minimum design UVT and all specified conditions in paragraph 1.03.A.1.

2. The UV manufacturer must have a third-party validation report meeting the requirements of paragraphs 1.02.C and 1.02.D. The validation report must substantiate that the UV system is capable of delivering a RED mJ/cm² for the design conditions stated in 1.03.A.1, and the design dose considerations in 1.03.A.2, as follows:

$$\text{RED} = D_{\text{req'd}} * \text{VF}$$

where

$D_{\text{req'd}}$ (dose required) = 5.8 mJ/cm² for 2.0-log credit for *cryptosporidium* and 11 mJ/cm² for 3.0-log *giardia* (Ref. Table 1.4 *Ultraviolet Disinfection Guidance Manual* (UVDGM))

VF = UV system Validation Factor calculated using the method outlined in the UVDGM (unique to each manufacturer and system).

The UV manufacturer must provide the Validation Report as part of the submittal package to substantiate the dose delivery (RED), and calculation of the Validation Factor used above.

3. The system shall be able to continue providing disinfection while the automatic cleaning system is in operation.
 4. The system shall be able to continue providing disinfection while the UV intensity sensor calibration is being performed.
 5. Maximum Allowable Reactor Headloss Through Any Single Reactor at Any Operating Condition - 2.5 inches H₂O.
- G. The manufacturer shall review the Engineer's final design drawings and shall issue a written statement certifying that the UV disinfection system will meet in every way the specified performance requirements set forth in paragraph 1.04.F, operating within the proposed final design layout.
- H. Existing Water Quality

Parameter	Average Value (Range)
pH (range)	7.3 (6.9 - 9.1)
Total organic carbon (mg/L)	1.53 (1.3 – 1.7)
Iron (µg/L)	40
Manganese (µg/L)	(1.2 – 12)
Alkalinity (mg/L)	16 (11.2 – 19.3)
Hardness as CaCO ₃ (mg/L)	21 (17 - 23)
Calcium as CaCO ₃ (mg/L)	6.3 (4.9 – 6.9)
Temperature (°F) (range)	33 - 85 degrees F
Turbidity	<5 NTU

1.05. SUBMITTALS

- A. Shop drawings shall be submitted in accordance with Section 01300. The following submittals shall be received by the Engineer within the time period specified in Section 01010. Shop drawings shall include the following, at a minimum:
1. Complete description of equipment in sufficient detail to verify compliance with these specifications.
 2. Detailed description of any exceptions taken to the specifications.
 3. Reference list detailing a minimum of five installations >0.5 mgd for the disinfection of potable water.
 4. Provide detailed calculations showing guaranteed power consumption at flow and percent UVT conditions using an EOLL and FF per paragraph 1.03.A.2.a. (A higher value shall be permitted if EOLL output has been provided and validated as described in paragraph 1.03.A.2.a.) The power consumption shall be the product of the measured power consumption per lamp (including ballast or CWT losses) and the total number of the operating lamps plus any required accessory power requirements including, but not limited to, cooling fans, cleaning system, etc.
 5. Performance affidavit in accordance with Article 1.04 of this section.
 6. Dimensions, weights, critical clearances and installation requirements including extent of any field assembly of subcomponents.
 7. Submit for the Engineer's review a list of all alarms with classifications of which are critical, major, and minor alarms.
 8. Descriptive information including catalogue cuts and manufacturers' specifications for all major components.
 9. Full Validation Report of third-party validation in accordance with the USEPA UVDGM. Report shall include MS2 phage and T1 phage.
 10. Provide a description of the hydraulic configuration used during validation testing including the length of straight pipe and hydraulic conditions necessary upstream and downstream from the UV reactor to ensure the desired flow profile is maintained and the design conditions are met.
 11. Indication of the Action Spectra Correction Factor (ASCF), if applicable, utilized for this UV system, for both MS2 and T1 phages.
 12. Electrical schematics, layouts, one-line diagrams, process and instrumentation (P&ID) drawings, and complete PLC wiring diagrams. At a minimum, control panel drawings shall be developed in AutoCAD and include the following details:
 - a. Scaled enclosure layout drawings detailing the locations of all components on the subpanel, door, and all other enclosure faces. Identify equipment manufacture and model numbers by cross referencing with the Bill of Materials.
 - b. Elementary wiring diagrams for the entire control panel, illustrating the distribution and separation of AC and DC circuits, fusing, circuit breakers,

Ethernet switches, PLC hardware, Operator Interfaces, and all other sub-panel mounted devices. Illustrate Ethernet and fieldbus network connections.

- c. PLC I/O module wiring diagrams for each individual PLC input and output module. Using standard symbols in conjunction with a legend, identify and differentiate wiring internal to the panel from wiring external to the panel. Provide detailed descriptions of individual contacts.
 13. Submit a PLC memory map to coordinate the location of data within the UV PLC. All data shall be available in PLC memory registers that are accessible from the end-user's existing SCADA/HMI application (GE iFIX). At a minimum, the submitted PLC memory map shall:
 - a. Be customized for this project.
 - b. Identify HMI-accessible PLC memory registers for all displayed on the UV system Operator Interface Terminal (OIT).
 - c. Provide the ability to remotely modify operational control setpoints.
 - d. Identify the datatype (i.e. Boolean, Integer, Real), the upper and lower range limits of the contained value, the sense of the contact when the stated condition is true (i.e. Open = Active), engineering units, and the breakout of multistate integers (i.e. 0=Mode 1, 1=Mode 2, etc.).
 14. The UV manufacturer must state the total connected load power requirement of the proposed system.
 15. Fabrication, assembly and installation drawings, electrical schematics and complete wiring diagrams. Shop drawings shall clearly state headloss through system under peak design flow conditions.
 16. The UV manufacturer must state maximum separation distance allowed between UV disinfection reactor and power supply and/or control module.
 17. List of items required to perform system installation not included in manufacturer's scope of supply.
 18. Confirm minimum cooling water flow requirements.
 19. Describe method of automatic quartz sleeve cleaning provided, including frequency and time required for maintenance.
 20. Identify frequency, duration and type of maintenance procedures that require the reactor to be taken out of service.
- B. All submittals noted below shall be received by the Engineer within six weeks after the Notice to Proceed is issued to the General Contractor. Submittals shall include, but not be limited to, the following:
1. Provide a statement of the proposed UV reactor guarantee, including the physical equipment, UV lamps, lamp sleeves, fouling/aging factor, and the system performance guarantee.

2. All interconnection and interface requirements, dimensions, weights, and locations of all major elements of the UV system including critical clearance requirements.
3. Complete information on PLC hardware, software, and programming, including ladder diagrams proposed for programming PLC. A narrative functional description shall accompany the ladder diagram describing system operation on a line-by-line basis. Narrative shall clearly describe operator interaction with all equipment including the OIT. Include samples of OIT color graphics (in color) with the narrative.
4. Detailed draft operation and maintenance manuals shall be submitted in accordance with this specification upon delivery of equipment to the site.
5. Manufacturer's instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing.
6. All warranties for complete system including, but not limited to, ballasts, CWTs, lamps, and quartz sleeves.

1.06. OPERATION AND MAINTENANCE

A. Instructions

1. Submit operation and maintenance instructions as required herein, including those instructions required by the applicable technical sections, 60 days before anticipated equipment startup.
2. Information shall be organized by section, each section covering a specific equipment item. Section shall be listed in a Table of Contents at the front of each volume.
3. Submit directory listing names, addresses, and telephone numbers of Engineer, Contractor, subcontractors, and major equipment suppliers.
4. Submit operation and maintenance instructions, arranged by system with the specification section referenced. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment, equipment specifications and guaranteed performance data.
 - c. Complete parts lists and parts diagrams for all equipment, including motors and drive units, showing manufacturer's identification numbers for each part.
 - d. Detailed startup and operating instructions, including technical bulletins and diagrams.
 - e. Detailed maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
 - g. List of spare parts, lubricants, tools and other items supplied with the equipment, identified by manufacturer's part numbers.

- h. Copies of shop drawings, where required, to adequately describe interrelation of components within a system.
 - i. Complete electrical and control schematics with labeled terminations.
 - j. List of special tools required for operation and maintenance.
 - k. Complete, annotated, and unprotected electronic copies of the final PLC and PLC operator interface/OIT programs on DVD media. Furnish four copies.
 - l. Assembly and disassembly instructions.
 - m. Recommendations for preventative maintenance.
 - n. Troubleshooting instructions.
 - o. Source of replacement parts and address and telephone number of the manufacturer's service representative.
- 5. Information not applicable to a specific piece of equipment installed on this project shall be removed from or crossed off on the submission.
 - 6. Submit project documents and certificates for UV disinfection system, including the following:
 - a. Shop drawings and product data.
 - b. Certificates.
 - c. Photocopies of warranties and bonds.
 - 7. Submit final volumes revised based on Engineer's comments, no later than 14 days prior to startup.

1.07. DELIVERY

- A. Delivery shall be no later than 14 weeks after the receipt of Engineer's approval of submittals.
- B. If the equipment must be stored, General Contractor shall store it in weathertight enclosures that protect the equipment from the elements. Temperature-controlled indoor storage is required. Boxing, crating, and other means that totally enclose and protect the equipment during storage is acceptable. For equipment storage greater than two months, equipment must be maintained in accordance with manufacturer's long-term storage instructions found within the operation and maintenance manual. Equipment shall be delivered in a manner suitable for storage by General Contractor. General Contractor will be required to off-load equipment upon arrival.
- C. Spare parts and assemblies shall be packaged in separate, structurally sound, waterproof containers clearly marked with the name of the part or assembly and the unit name of which it is a component.

1.08. WARRANTY

- A. The equipment furnished under this section shall be free of defects in materials and workmanship, including damages that may be incurred during shipping for a period of one year from successful equipment startup (Substantial Completion).
- B. Type A, High Intensity, Medium Pressure UV Lamps - The UV lamps shall be warranted for a minimum of 4,000 hours of operation (lamp output at end of lamp life shall be guaranteed to be equal to or greater than the EOLL stated in the validation report), prorated after 1,000 hours based on a maximum of 4 cycles per day.

Type B, Low Pressure, High Output - The UV lamps shall be warranted for a minimum of 12,000 hours of operation (lamp output at end of lamp life shall be guaranteed to be equal to or greater than the EOLL stated in the validation report), prorated after 9,000 hours based on a maximum of 4 cycles per day.
- C. By supplying a product under the contract, the manufacturer agrees that all manufacturer's warranties, expressed or implied, pass through the Contractor to Owner. This warranty obligation starts on the date of the General Contractor's substantial completion and survives any inspection by, delivery to, acceptance by or payment by the Owner or Contractor for the goods furnished by the manufacturer. Further, this warrants that the equipment designed, manufactured and/or used meets all applicable federal, state and local laws, rules and regulations, including applicable OSHA standards.
- D. Guaranteed minimum lamp replacement cost shall be valid for five years with the provision for a Consumer Pricing Index adjustment factor. Guaranteed maximum lamp replacement cost shall be as stated in the Bid Form.

PART 2 PRODUCTS

2.01. GENERAL

- A. To be acceptable, the UV system must operate in a closed vessel and be one of the following types:
 - 1. Type A - System must use high intensity, medium pressure UV lamps and electronic ballasts with multiple power settings or CWT, and incorporate an automatic on-line mechanical or mechanical/chemical sleeve cleaning system for lamp sleeves and sensor sleeves/windows.
 - a. Type A UV disinfection system shall be manufactured by Engineered Treatment Systems (ETS), LLC, Beaver Dam, WI; or equal
 - 2. Type B - System must use low pressure, high output UV lamps and electronic ballasts with multiple power settings or CWT, and incorporate an automatic on-line mechanical/chemical sleeve cleaning system for lamp sleeves and sensor sleeves/windows.
 - a. Type B UV disinfection system shall be manufactured by Trojan Technologies, London, Ontario; or equal

2.02. EQUIPMENT DESIGN

A. UV Reactor

1. The UV reactor shall be of welded construction manufactured from Type 316L stainless steel.
2. The UV reactor shall be designed to handle a maximum operating pressure of 150 psig, and shall be fully assembled and hydrostatically tested to 1.5 times the rated operating pressure, for at least 10 minutes without leakage, in the factory prior to shipment.
3. Each UV reactor shall consist of either Type A high intensity, medium pressure UV lamps or Type B low pressure, high output UV lamps.
4. Each lamp shall be enclosed in an individual quartz sleeve.
5. Each quartz sleeve shall be independently sealed within the reactor.
6. The UV reactor shall be provided with access ports for easy access to the quartz sleeves and cleaning system.
7. Air trapped in the reactor shall result in reactor shut down to avoid overheating.
8. All wetted components within the reactor shall be NSF 61 certified. Any chemicals shall be NSF 60 certified.
9. Reactors weighing greater than 500 lbs. shall be provided with lifting lugs.
10. The reactor shall include at least one manual drain valve. Valve shall be 316 stainless steel construction.

B. UV Lamps

1. UV manufacturer shall provide detailed description of the lamp dimensions and electrical requirements.
2. Type A - High Intensity, Medium Pressure
 - a. The UV lamps shall be high intensity, medium pressure, mercury arc discharge type.
 - b. The filament shall be significantly rugged to withstand shock and vibration.
 - c. The lamp bases shall be resistant to UV and ozone.
 - d. Lamp changes shall be easily performed by operating personnel at the plant. Systems that require the lamp assemblies be returned to the factory are not acceptable.
 - e. All wire lengths to be used to connect the lamps to the power distribution module shall be enclosed inside a module or junction box, and not exposed to weather.

3. Type B – Low Pressure, High Output
 - a. Lamps shall be low pressure, high intensity amalgam lamps..
 - b. The filament shall be designed to withstand shock and vibration.
 - c. Lamp bases shall be resistant to UV light.
 - d. All electrical connections to the lamp shall be terminated at one end.
 - e. Lamp base shall be designed to prevent arcing between electrical pins.
 - f. Lamps shall have a monochromatic spectral output with the emissions peaking at 252 nanometers.

C. UV Lamp Sleeves

1. Type A - The UV lamp sleeves shall be Type O22, fully annealed clear fused quartz tubing or Type 214A clear fused quartz circular tubing.
2. Type B – The lamp sleeves be clear fused Type 219 quartz with a minimum UV transmissibility of 89 percent.
3. UV manufacturer shall provide calculations showing the maximum allowable pressure and maximum allowable vacuum for the lamp sleeves and the maximum bending stress the lamp sleeves may experience under the maximum specified flow rate conditions.

2.03. CONTROLS AND INSTRUMENTATION

A. UV Intensity Sensors

1. The sensors provided with the UV system shall provide continuous performance verification over the required ranges of water transmission, lamp life and quartz sleeve fouling, as indicated in these specifications.
2. For Type A systems, one sensor shall be provided per lamp. For Type B systems, one sensor shall be provided for every 10 lamps.
3. The UV intensity sensors shall be located inside the reactor and contained within protective quartz sleeves.
4. The sensors shall be unaffected by static, electrical, magnetic, electromagnetic fields, shortwave radio emissions, or other electronic interference.
5. The system shall incorporate a method to perform checks and rescaling of UV sensors without requiring the reactor to be taken off-line or decreasing the treatment capacity.
6. During initial validation testing, duty UV sensor measurements must be within 10 percent of the average of two or more reference sensor measurements.
7. During initial UV sensor calibration testing, measurements must be within 20 percent of the average of two or more reference sensor measurements. Reference UV

sensors shall be calibrated against a traceable standard as listed in the UVDGM, such as:

- a. National Physical Laboratory (NPL).
 - b. National Institute of Standards and Technology (NIST).
 - c. Deutsche Vereinigung des Gas - und Wasserfaches (DVGW).
 - d. Österreichisches Normungsinstitut (ONORM).
8. Sensors must meet the requirements of the USEPA UVDGM. Sensor(s) must filter out wavelengths below 220 nm and have a spectral response peaking between 250 nm and 280 nm with less than 10 percent coming from wavelengths greater than 300 nm.
 9. UV manufacturer shall provide the following information on the UV sensor(s) including but not limited to: spectral response, acceptance angle, external dimensions, working range in mW/cm^2 , measurement uncertainty, environmental requirements, linearity, temperature stability, data and calculations showing how the total measurement of uncertainty of the UV sensor used during validation and operation meets the criteria established in the USEPA UVDGM.
 10. A certified reference sensor in accordance with paragraph 2.03.A.7 above shall be provided to obtain UV sensor reference readings.

B. Ballasts

1. Ballasts shall be of a high frequency output, electronic or electromagnetic design with a minimum efficiency of 93 percent at full load, and a power factor of 93 percent or better.
2. Ballasts shall have a variable operation range of 60 to 100 percent of full rated output.
3. The system shall meet the harmonic distortion requirements of IEEE 519.
4. Ballasts shall have a mean design life expectancy of at least five years.
5. Ground fault detection shall be provided for each lamp circuit.
6. Ballasts shall tolerate supply voltage fluctuations of +10 percent/-40 percent without extinguishing the lamps.
7. Ballasts provided shall be identical to those used for validation testing.

C. Constant Wattage Transformers

1. CWTs shall be of a high frequency output, electronic or electromagnetic design with a minimum efficiency of 93 percent at full load, and a power factor of 93 percent or better.
2. CWTs shall have a variable operation range of 35 to 100 percent of full rated output.

3. Each CWT shall supply power to one reactor or one lamp, or one 10 kW CWT and two 20 kW CWTs supply power to one reactor.
 4. CWTs shall have a mean design life expectancy of at least 10 years.
 5. Ground fault detection shall be provided for each lamp circuit.
 6. CWTs shall tolerate supply voltage fluctuations of +10 percent/-40 percent without extinguishing the lamps.
- D. Control Power Panel (CPP)
1. Power distribution and control for each UV reactor shall be through the associated CPP. The CPP shall house all power supplies and control hardware.
 2. The CPP shall be designed to operate with the following electrical supply: 208 VAC, 3 phase, 60 Hertz, 2 wire + ground. If other types of electrical supply are required, then the Contractor is responsible for providing transformers and the conduit and wire from the transformer to the CPP. Refer to the Contract Drawings for additional requirements.
 3. The CPP enclosure shall be epoxy painted carbon steel, NEMA Type 12, ventilated, and forced-air cooled.
 4. The CPP shall be capable of being installed up to 40 feet (external running cable length) away from the UV reactor.
 5. Each CPP shall be provided with a lockable disconnect handle that shall shut down the reactor/cabinet power when the cabinet door is opened.
 6. CPP enclosure dimensions shall not exceed 72 inches high by 30 inches wide by 18 inches deep.
- E. Control and Instrumentation
1. General
 - a. The new pump station control panel will receive tank level signals and control operations of the pumps.
 - b. One CPP shall be provided for each UV reactor. The CPP shall facilitate complete monitoring and control of each UV system, including electrically actuated reactor isolation valves. The CPP shall provide communications to the pump station PLC for all alarms, UV system status, pump permissives, and all necessary and specified communications.
 - c. Each UV reactor shall be controlled independently by its respective CPP.
 - d. Each CPP shall utilize an Allen-Bradley CompactLogix PLC which shall continuously monitor and control UV reactor functions. Interim or proprietary controllers outside the PLC are not acceptable.
 - e. Control of multiple reactors shall be accomplished through communications between the pump station control panel and UV reactors' CPPs. The UV system CPPs shall communicate with the pump station control panel via

Ethernet IP. The UV supplier shall provide and configure any software and hardware in their CPPs to communicate with the pump station control panel. The pump station control panel will provide the start/stop signals for each UV system.

- f. Each CPP shall communicate directly with the following external equipment for the operation of the UV System:
 - 1) One electrically operated isolation valve for each reactor. The CPP is responsible for opening, closing, and monitoring the status of the isolation valve. UV Manufacturer shall determine whether the open/close command for the isolation valve is via 4-20ma analog signal or via a contact closure. Coordinate the isolation valve actuator requirements with the Contractor.
 - 2) One magnetic flow meter for each reactor.
 - 3) One UVT analyzer for both reactors.
 - 4) The pump station PLC.
- g. Each reactor's control system shall incorporate an emergency stop button as a hardwired interlock, independent of the PLC control.

- 2. General Sequence of Operation – The pump station control panel will alternate the UV reactors in a duty and standby fashion. The reactor(s) will be automatically initiated by signals from the pump station control panel to the reactor CPP based on liquid level in the water storage tank. Both UV reactors shall be capable of operating simultaneously, as both pumps and both reactors may be called to run in the event of an emergency or high demand condition. The UV reactor(s) will be signaled to start prior to starting the pumps so the reactor is able to complete its warm-up phase prior to the pumps being called to operate.

The reactor CPP will control isolation valve(s) downstream of the reactor(s). There will also be a manual isolation valve upstream of the reactor. A no flow or low flow condition, as determined by the CPP through the flow meter, shall activate an alarm and shut down reactor to prevent it from overheating the unit. The controls timing will be relative to the lamp warm-up period such that the pump(s), valve(s), and reactor(s) will operate sequentially. Operating procedures are as follows:

- a. The pump station control panel will monitor the water level in the water storage tank. When a low level setpoint in the water storage tank is reached, the PLC will send a "Start" signal to the lead (primary) UV reactor CPP.
- b. When a "Start" signal is received by the CPP the reactor shall energize and begin the warm up sequence.
- c. When the reactor warm-up period has completed, the CPP shall output a "Ready" permissive to the pump station PLC to allow a pump to be activated. The CPP shall then open the reactor control valve.
- d. When the CPP provides a reactor "Ready" permissive to the pump station control panel, the PLC will start the lead pump. The reactor flow meter shall measure and confirm the flow of water through the reactor. The UV manufacturer shall provide the interlocks necessary to prevent the reactor

from overheating and damaging itself in the event that no or low flow conditions are recognized by the CPP.

- e. The pump and reactor run together until the tank level reaches the “pump off” setpoint, or the pumps are manually commanded to stop at the pump station control panel.
 - f. When the water storage tank reaches the “Pump Off” setpoint, or the control panel receives a Pump Stop command, the pump station control panel stops the pump, then sends a “Stop” signal to the reactor CPP. The reactor CPP shall first close the reactor control valve, then shut down the reactor, and the lamps begin the cool-down period.
3. Failure Mode – Upon shutdown of a reactor due to an alarm, the reactor will go through an automatic controlled shutdown according to the following sequence:
- a. Send critical alarm shutdown signal to the pump station control panel. The pump station control panel shuts down the pump.
 - b. Reactor CPP shall close the control valve for the faulted reactor.
 - c. Once the control valve is shut, the reactor shuts down and begins its cool down sequence and an alarm is generated.
 - d. If the pump station control panel still needs to run a pump, it will send a run signal to the other (not-faulted) UV reactor CPP.
4. Off-Specification Water:
- a. When the CPP determines that the UV reactor is operating off-specification, it shall activate a ‘critical alarm’ and ‘off-specification alarm’ and shut down the duty reactor.
 - b. If the pump station control panel determines that the booster pumps are still being called to run, then the standby UV reactor will be called to run.
 - c. If the off-specification event due only to low UV dose and the standby reactor (now the duty reactor) also fails due only to low UV dose, then the pump station control panel will call both the duty and standby UV reactors to operate together in an attempt to achieve the required dose.
5. UV System Controls - Each reactor(s) shall be automatically controlled through the manufacturer’s control system (CPP).

The CPP for each reactor shall automatically control the electrically actuated isolation valve for each reactor. The reactor CPP shall receive a 4-20 mA flow signal from the flow meter indicating flow is occurring through the reactor. A no flow or low flow condition shall activate an alarm and shut down reactor to prevent it from overheating the unit. Scaling of the flow signal shall be coordinated with the flow meter manufacturer. The reactor CPP shall receive a 4-20 ma UVT signal from the UVT analyzer. Operating procedures shall be as follows:

- a. UV system in online reactors shall operate based on a Calculated Dose Approach using flow and the other monitored parameters to achieve required dosing.

- b. In the event of an operator initiated shutdown, the reactor shall complete its manufacturer required shutdown sequence, terminating with the shutdown of the reactor.
- 6. Programmable Logic Controller
 - a. Each reactor CPP shall contain an Allen-Bradley CompactLogix PLC, which has been factory programmed and tested prior to shipment.
 - b. The CPP shall monitor the continuous operation of the following, at a minimum, and make this data available to the pump station control panel via Ethernet:
 - 1) For Individual Reactors
 - a) Water flow rate.
 - b) UV dose.
 - c) UV dose setpoint.
 - d) Reactor temperature.
 - e) Reactor leak (if available).
 - f) Lamp/electrical compartment door access (if available)
 - g) Water flow rate.
 - h) UV sensor irradiance for all lamps.
 - i) Cleaning mechanism status and position.
 - j) Cleaning cycle counts.
 - k) Reactor in calibration mode.
 - l) Reactor warm-up sequence time countdown.
 - 2) For Individual Lamps
 - a) Lamp current.
 - b) Ballast overtemperature.
 - c) Ground fault.
 - d) Individual Lamp Run Hours - Both resettable and non-resettable.
 - e) Individual Lamp Starts - Both resettable and non-resettable.

- 3) Per Power Supply Cabinet
 - a) Cabinet overtemperature.
 - b) Emergency stop condition.
 - c) Control power.
 - d) Power consumption.
- 4) Per Electric Isolation Valve
 - a) Open/Closed status.
 - b) Valve Locate/Remote status.
 - c) Valve fault.
- 5) For the UVT Analyzer
 - a) UVT measurement.
 - b) Analyzer fault status.
- 6) Alarms – The following alarms, at a minimum, shall be available in each CPP for communication to the pump station control panel via Ethernet.
 - a) Emergency stop.
 - b) Off-specification water.
 - c) Low water level/ reactor not full (if available).
 - d) Low water flow rate (out of validation range)
 - e) High water flow rate (out of validation range).
 - f) Low and Low-Low UV dose.
 - g) UVT analyzer fault.
 - h) Flow meter fault.
 - i) Reactor not in Remote Auto.
 - j) Individual reactor high temperatures (if available).
 - k) Individual reactor leaks.
 - l) Reactor access cover open (if available).
 - m) Individual lamp failure/fault.

- n) Lamp runtime hours exceeded.
 - o) Power distribution/ballast power supply cabinet door open.
 - p) Power distribution/ballast power supply high temperature.
 - q) Ballast high temperature.
 - r) Low UV transmittance
 - s) Low-Low UV transmittance (out of validation range).
 - t) Low UV intensity.
 - u) Cleaning system failure.
 - v) Communications failure of the PLC and each reactor.
 - w) UV control panel AC power loss.
- c. The following alarms, at a minimum, shall be classified as 'critical' and shall generate UV reactor failure. The UV system manufacturer is responsible for determining whether additional conditions generate a critical alarm.
 - 1) Off-specification water.
 - 2) High reactor temperature (if available).
 - 3) Emergency Stop.
 - 4) Flow Meter Fault.
 - 5) UVT Analyzer Fault.
- d. Manufacturer shall provide the UV PLC control system with a minimum 10 percent spare I/O of each type.
- e. Manufacturer shall provide the UV PLC control system with a minimum 25 percent spare program memory.
- f. Manufacturer shall provide the programming software required to program the PLC and PLC operator interface.
- g. Manufacturer shall design and certify the UV PLC control system in accordance with UL 508A.
- h. All alarms generated by the UV system shall be logged and displayed on the operator interface unit. Each alarm shall be time and date stamped when it occurs.
- i. Submit for the Engineer's review a list of all alarms with classifications of which are critical, major, and minor alarms.
- j. PLC-UV application software shall incorporate delay times for all alarm signals to allow equipment component (e.g., electronic power supplies) to

carry out self-diagnostics and corrective action before initiating external UV system alarms.

UV PLC shall monitor individual lamp status and shall provide status information on the operator interface showing individual lamp on/off status, module running hours, bank on/off cycles, individual lamp running hours, on-spec and off-spec volumes, and on-spec and off-spec percentages. All information available on the operator interface unit shall be communicated to the pump station control panel.

Routine maintenance of the reactors, including taking them off line, shall not produce any alarms under "Maintenance Mode," which turns off any alarms that may otherwise sound.

- k. The control system shall be capable of controlling the on/off cycling and lamp power of the UV chambers based upon a flow and dose pacing philosophy. The UV control system shall receive inputs from the UV intensity sensors, UV transmittance monitors, from the process liquid flow meter, from the UV outlet valves, and shall automatically control the lamps to maintain the required UV dose under all operating conditions. UV systems shall monitor and control UV dose based on the validated dose equations from the approved bioassay in accordance with the USEPA UV guidelines.

The UV system shall be programmed to allow for operator-selectable UV dosage basis. Selections shall include 2-log *cryptosporidium* inactivation based on MS2 phage or T1 phage, and 3-log inactivation of *giardia* based on MS2 phage or T1 phage. Based on which of the four options is selected by an operator, the unit shall automatically provide the required UV dose. The UV system control system shall be capable of communicating all of the system status information (including those items listed above) to the pump station control panel.

- l. The UV control system shall also be capable of selecting simple UV dose and flow pacing to operate on an operator input UV transmittance if the UVT sensor malfunctions. This alternative control mode shall be selectable at the operator interface with password protection. This mode of operation shall also utilize the input from the process liquid flow meter.
- m. A 4-20 mA flow signal will be transmitted to the UV control system from the process flow meter. Each UV reactor will have a dedicated flow meter.

7. Operator Interface

- a. Complete control and monitoring of each reactor shall be accomplished through the operator interface located on the CPP.
- b. The operator interface shall be an Allen-Bradley PanelView Plus 1000 color touch screen.
- c. The operator interface shall be menu driven, and shall display the following system information when prompted: reactor status, individual lamp status, lamp operating hours, RED (dose), UV intensity, power level, alarms, alarm history, flow per reactor, and total facility flow.

- d. The most recent alarms shall be displayed on the operator interface when prompted, recorded by alarm type, date and time of occurrence, and date and time of correction.
 - e. The UV manufacturer shall provide PLC and OIT programming to calculate all data required to populate regulatory reports required by the NYSDOH, including an Off-Specification Report for each reactor. For the Off-Specification Report, the following data shall be stored within UV PLC memory registers for display within a UV OIT graphic, as well as for remote monitoring, reporting, and trending through the pump station control panel:
 - 1) Start Time of Event - Format: MM/DD/YY HH:MM.
 - 2) Average Flow Rate During Event - Units: gpm.
 - 3) Flow Total at Beginning of Event - Units: gallons.
 - 4) Flow Total at End of Event - Units: gallons.
 - 5) End Time of Event - Format: MM/DD/YY HH:MM.
 - 6) Duration of Event - Format: HH:MM:SS.
 - 7) Off-Specification Volume - Units: gallons or kgal.
 - 8) Minimum Dose During Off-Spec Event - Units: mJ/cm².
 - 9) Total Off-Specification volume for each day.
 - 10) The last 30 days of Off-Specification water produced.
 - 11) Minimum validated UV dose for each day.
 - 12) Other data required by the NYSDOH for reporting.
8. Remote Monitoring/Control
- a. Communication between the UV reactors and the pump station control panel shall be through the following protocol:
 - 1) Ethernet IP.
 - b. Each reactor shall be capable of being placed in either Hand or Auto mode.
 - c. Manufacturer shall provide each system with the following customer interface hardwired I/O:
 - 1) Discrete output indicating Critical Alarm.
 - 2) Discrete output indicating Major Alarm.
 - 3) Discrete output indicating Off-Specification condition.
 - 4) Discrete output indicating System Ready.

- 5) Discrete on/off status output.
- 6) 4-20 mA flow signal analog input (one for each reactor).

F. Dose Pacing

1. Manufacturer shall provide a dose-pacing system to modulate the lamp power levels based on the flow rate, UV intensity sensor signal(s), and UV transmittance values in accordance with the Validation Report.
2. The dose-paced system shall calculate the required UV dose (RED) and automatically adjust the lamp power to provide that dose.

G. Flow Meters - Each reactor's control system shall be configured to receive a signal proportional to flow in the reactor to control output. This signal shall be used in determining the required UV irradiance setpoint and lamp power level as described above.

H. Safety Features

1. Each UV reactor shall be equipped with a cover to protect the lamps electrical connections. For operator safety, the protective cover shall be equipped with a switch to disconnect power to the lamps when the cover is removed.
2. Each CPP and reactor shall be equipped with an emergency stop button to shut off power to the lamps.
3. Each UV reactor shall be equipped with means to detect a failure in the quartz sleeve seal.
4. Each UV reactor shall be equipped with one of the following:
 - a. A temperature switch to prevent the reactor from overheating. The temperature switch shall be wired to the CPP and shall shut the reactor down and initiate a critical alarm condition when activated.
 - b. A water level sensor to prevent operation of the UV lamps in air. The level sensor shall be wired to the CPP and shall shut the reactor down and initiate a critical alarm condition if low water level is detected.
5. Each reactor shall be capable of detecting lamp or sleeve breakage.

I. On-line UVT Analyzer

1. An on-line UVT monitor which shall be supplied by manufacturer shall automatically monitor the UVT of the process stream (measured at 254 nm, 1 cm path length). The UVT analyzer shall have a range of 70 to 100 percent or greater and have an accuracy of 0.5 percent of full scale or better.
2. The UVT analyzer shall include a UV lamp, UV sensor, drive system, system controller and operator interface.
3. The operator interface shall display the system status and allow for manual on/off system control. The operator interface shall be located on the door of the enclosure.

4. Inlet/outlet fittings to be 1/4-inch tube fittings for connection to process stream and drain.
5. UVT analyzer shall have an automatic chemical cleaning system.
6. A 4-20 mA output shall be provided for data transmission to remote devices. A discrete common alarm shall be provided for remote indication of alarm condition.
7. The required analyzer sample flow rate shall be 1000 ml/min or less. Manufacturer shall provide regulators and/or pressure reducers to maintain required sample pressure.
8. Power supply to the on-line UVT analyzer shall be 120V, single phase, 60 Hertz, 250 VA.
9. Analyzer shall be UL, CSA, and CE approved and shall be housed in a NEMA 4X enclosure.
10. The process stream temperature range to be 32 to 104 degrees F.

J. Cleaning System

1. Each UV reactor shall be equipped with an automatic on-line mechanical (Type A) or on-line mechanical/chemical (Type B) cleaning system.
2. The cleaning system shall provide mechanical or mechanical/chemical cleaning abilities for the lamp sleeves, and mechanical cleaning abilities for the UV sensor sleeves/windows, complete with an automatically initiated and controlled cleaning cycle. The UV system shall be fully operational and providing disinfection throughout the total duration of the cleaning cycle.
3. Cleaning cycle intervals shall be field adjustable via the CPP operator interface. Manual cleaning system control shall also be through the CPP operator interface.
4. For mechanical/chemical cleaning systems, the manufacturer shall provide the cleaning reagents and solutions required for initial equipment testing and equipment startup. Cleaning reagents and solutions used shall be NSF™ Standard 60 approved.
5. Reactors shall not require a separate chemical storage and handling system and shall not require filling or draining to clean.

2.04. SPARE PARTS

- A. Provide spare parts that are identical and interchangeable with original parts.
- B. For each part (or group of small parts), provide a tag which shall carry the following information: identity of the equipment the part is for; identity or name of the part itself; date and manufacturer's name and identification number of the part.
- C. Review spare parts with Owner and Engineer at time of delivery and provide written certification of Engineer and Owner's review and acceptance. Spare parts delivered to the site and not inventoried and certified with the Owner and Engineer will be considered as not provided.

D. The following spare parts and safety equipment shall be supplied:

1. One reactor's total quantity of UV lamps.
2. One reactor's total quantity of quartz sleeves.
3. One set of seals and O-rings per reactor.
4. Two face shields, able to block UV light wavelengths between 200 and 400 nm.
5. One set of replacement wipers per reactor.
6. Two ballasts or CWTs.
7. Two ballast cooling fans or two CWT cooling fans.
8. Two duty UV sensors.
9. Two reference UV sensors.
10. Cleaning solution for one year of operation, if applicable.
11. One replacement PLC central processing unit.
12. One replacement Ethernet switch.
13. One PLC I/O module for each type used.
14. One cooling exhaust fan for every one provided as part of the electrical and CPP panels.
15. One complete uninstalled spare UVT analyzer, ready for installation.

PART 3 EXECUTION AND SPECIAL SERVICES

3.01. EQUIPMENT INSTALLATION

- A. Equipment shall be installed by the Contractor in accordance with the manufacturer's engineering drawings and instructions in these specifications. The manufacturer shall provide services during installation as specified herein.
- B. Installation Service – UV equipment manufacturer's certified representative shall certify installation, recommend or make adjustments and supervise field testing of equipment.

3.02. FIELD TESTS

- A. Perform field tests as specified in this section.
- B. Preliminary Field Tests - Furnish all labor, materials and instruments to perform all preliminary field tests of equipment. Make all changes, adjustments and replacements required to comply with the requirements of the specification. Demonstrate that:
 1. Equipment is installed in the orientation specified.

2. Equipment is prepared for operation in strict accordance with the specifications and with manufacturer's recommendations.
- C. Final Acceptance Tests (Functional Tests) - Perform final tests prior to startup. Provide services of the manufacturer's representative. Furnish labor, fuel, lubricants, energy, water and all other materials, equipment and instruments necessary for all acceptance tests. Schedule final acceptance test to consist of the following checks as a minimum:
1. That the equipment meets the specified performance requirements in every detail and performs its intended function without any unusual vibration, noise or other signs of possible malfunction.
 2. Where equipment is capable of operation in more than one mode or equipment performs more than one function, each operational mode or function shall be checked for proper performance.
 3. All controls, both mechanical and electrical, shall be checked individually for proper connection and operation.

3.03. MANUFACTURER'S SERVICES

- A. Furnish the services of a qualified representative in accordance with Section 01640 and as specified herein. The time period for the supervision and instructions shall be as stated in this section and Section 01640. Where no specific duration of visit is listed, the length of time shall be such to allow the equipment representative ample time to follow the requirements outlined in this section and the individual technical section covering the particular equipment item.
- B. The manufacturer 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. Instructions - Instruct the Owner's operating personnel in operation and maintenance of equipment. A written report by the representative covering instructions given shall be sent to the Owner and Engineer.
- D. Certification of Equipment Compliance – Submit Installation Certificate in accordance with Section 01640.
- E. Record drawings of the final programmable controller program, control panel layouts, and screen layouts shall be submitted by the manufacturer following the final acceptance.
- F. Installation Days - Manufacturer's representative shall be at the project site for a minimum of two days to verify the proper installation of the equipment specified herein.
- G. Spare Parts Delivery - Manufacturer's representative shall be at the project site for a minimum of one day to review spare parts with Owner and Engineer at time of delivery and provide written certification of Engineer and Owner's review and acceptance. Spare parts delivered to the site and not inventoried and certified with the Owner and Engineer will be considered as not provided.
- H. Final Acceptance Days - Manufacturer's representative shall be at the project site for a minimum of two days per reactor to verify that the system meets the requirements of this specification.

- I. Training - Manufacturer's representative shall be at the project site for a minimum of two days to conduct initial training for the Owner's personnel. Training shall include the items specified in Section 01640 for all major components of the UV system. A second one-day training session shall be conducted on site during the warranty period. The Owner will arrange the time for both sessions through the Contractor.
- J. Arrange for the manufacturer's representative to visit the pump station for a minimum of two days over two separate visits after initial startup and during the first year of operation. The purpose of these visits shall be to review equipment operation, assist the operators in correcting operational problems and basic inspection of the equipment.
- K. Service Scheduling - As required during the warranty period.
- L. Contractor shall arrange for a qualified UV manufacturer's representative to check and supervise operation and instruct the Owner's operators in operation, proper maintenance, and repairs for two years after Substantial Completion on an as-needed basis.

3.04. SERVICE CONTRACT

- A. Upon achieving Substantial Completion, and after providing all services as listed in Article 3.03, manufacturer shall enter into a Service Contract Agreement with Owner. The bid price of the equipment shall include the costs for a Service Contract for a period of two years from the date of Substantial Completion. The Service Contract shall provide the following:
 - 1. Quarterly site visits by the manufacturer to review the operations of the UV system, confirm required maintenance is being performed, answer any Owner questions or concerns, provide up to four hours of instruction to Owner personnel as a refresher for operations and maintenance of the system, make minor PLC programming changes if deemed necessary, and confirm system is operating within the parameters of the warranty and guarantee.
 - 2. Within 14 days of each site visit, submit a written report to Owner documenting any observations or recommendations, changes made, or any required corrective actions.
 - 3. If upon Owner request, a site visit is required to respond to an issue with the UV system, manufacturer shall respond within 24 hours. If the issue is determined to be a warranty matter, the response shall not count against the quarterly visits required by paragraph 3.04.A.1 above.
 - 4. For any work performed on the UV system during a quarterly visit, the required parts shall come from the Owner's spare parts inventory. If a part is not available, the cost for the required part shall be by the Owner. If a part is covered by warranty, its cost shall be covered in accordance with the terms of the applicable warranty.
 - 5. Unlimited phone tech support shall be available to Owner during the two-year Service Contract.
 - 6. Follow-up responses resulting from unqualified manufacturer personnel providing the first response shall be at no cost to Owner.
 - 7. The service contract shall be delivered to the Owner within 90 days of Substantial Completion.

- B. The authorized representative for the manufacturer shall be located within 150 miles of the project site.

END OF SECTION

SECTION 15060
INSIDE PROCESS PIPING

PART 1 GENERAL

1.01. WORK INCLUDED

- A. Inside process pressure piping, fittings, and specials located inside structures or on process tanks and equipment.
- B. Miscellaneous appurtenances.
- C. Shop tests.
- D. Installation.
- E. Testing.
- F. Pipe schedule.

1.02. RELATED SECTIONS

- A. Section 01039 - COORDINATION
- B. Section 01300 - SUBMITTALS
- C. Section 01700 - RECORD DOCUMENTS
- D. Section 02675 – DISINFECTION OF WATER DISTRIBUTION SYSTEMS
- E. Section 09900 - PAINTING
- F. Section 15100 - INSIDE PROCESS VALVES AND HYDRANTS
- G. Section 15140 - SUPPORTS AND ANCHORS

1.03. REFERENCES

American National Standards Institute (ANSI)
American Water Works Association (AWWA)
American Society for Testing Materials (ASTM)

- 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

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 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 D2672	Solvent Cement Joint Sockets or Belled PVC Pressure 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 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. Cast Iron Soil Pipe

Cast Iron Soil Pipe Institute (CISPI)	Specification HS-67
ANSI A112.5.1	No-Hub Pipe
ASTM C564	Rubber Gaskets for Cast Iron Soil Pipe and 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

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data - Provide data, indicating conformance to ASTM/AWWA codes, pipe material, sizes, class, dimension, joint type, and accessories.
- C. Layout Drawings - Show complete piping layout, including materials, sizes, classes, locations, and dimensions.
- D. Results of shop tests, if required.
- E. Manufacturer's Certification - Certify that products meet or exceed specified requirements.

1.05. PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01700.

1.06. FIELD MEASUREMENTS

- A. Prior to start of construction, verify the field measurements and elevations that existing conditions, piping, and equipment are as shown on Drawings. Notify Engineer of specific differences.

1.07. TEST REQUIREMENTS

- A. Requirements for pressure testing of water distribution and process piping are described in Article 3.03.

1.08. COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate the work with local owners where operation of existing structures, pumping stations, treatment facilities, and industrial processes is affected.

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 herein, in the pipe schedule, or as shown on the Drawings.

- C. All pipes and fittings shall be flanged joint or grooved end pipe coupling ductile iron as shown on the Drawings or as listed in pipe schedule, except as follows:
 - 1. Gas pipe shall be steel, Schedule 80 minimum.
 - 2. Chlorine gas, chlorine solution and corrosion inhibitor pipe shall be solvent weld socket joint PVC or contained PVC piping. Refer to the Contract Drawings for pipe type, size and location.
 - 3. Potable and non-potable water pipe 3 inches or less in diameter shall be copper.
- D. The inside process piping system shall be installed as shown on the Drawings.

2.02. MATERIALS - DUCTILE IRON

- A. Ductile Iron Pipe - AWWA C151/ANSI A21.51: Ductile iron pipe material minimum rated water pressure of 150 psi and minimum Class 53.
- B. Ductile iron pipe and fittings for all potable and non-potable water lines shall be double cement lined and seal coated inside and out in accordance with ANSI/21.4/AWWA C104.
- C. All ductile pipe and fittings used as process pipe shall be lined and coated with asphaltic material, minimum 1 mil thick in accordance with ANSI/AWWA C104/A21.4.
- D. Fittings shall conform to ANSI A21.10/AWWA C110.
- E. Joints - Fittings shall be furnished with either flanged joint or grooved end pipe coupling joints. The type of joint shall meet the following applicable requirements:
 - 1. Flanged Joint
 - 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. Flanges shall be 125-lb. ASA flanges rated for a maximum working pressure of 150 psi.
 - c. The fittings shall be of standard lengths given under the ANSI Specification B16.1, unless otherwise noted.
 - d. The pipe lengths shall be fabricated to meet the requirements of the Drawings.
 - 2. Flanged Adapters
 - a. Flanged adapters supplied by the manufacturer of pipe couplings, shall be provided at a minimum, at all couplings to equipment, tanks, valves and as otherwise shown on the Drawings.
 - b. Flanged adapters supplied by the manufacturer of pipe couplings shall be 125-lb. ASA flanges rated for a maximum working pressure of 150 psi.
 - c. Flanged adaptors shall be provided with fluoropolymer coated, high strength, low alloy steel bolts and hardware in accordance with AWWA C-111..

- d. Flanged adapters for pumps shall be in accordance with couplings and adapters as stated hereinafter.

2.03. MATERIALS - PLASTIC

- A. Polyvinyl Chloride (PVC) Pipe - Less than 4 inches in diameter ASTM D1785, Type 1, Grade 1, (PVC 1120) PVC pressure pipe material conforming to ASTM D1784 Schedule 80, solvent cement socket weld-type joints shall be used on pipe runs and fittings to be PVC.
- B. Joint sockets for belled PVC pressure pipe to conform to ASTM D2672 and ASTM D2564 (solvent cements).
- C. Socket-type fittings for Schedule 80 PVC pipe pressure pipe to conform to ASTM D2467.
- D. Solvent cement shall be compatible with sodium hypochlorite (15 percent strength).
- E. Plastic Pipe Unions - Shall be provided on PVC piping:
 - 1. At all connections to equipment, tanks and valves; at all wall and floor penetrations; and as otherwise shown on the Drawings.
 - 2. All piping and fittings shall be of the same color and provided by the same manufacturer.
 - 3. All threaded unions on the chemical piping lines shall have splash guards.
 - 4. Splash guards shall be constructed of PVC material and shall be installed such that any leakage is directed away from the space occupied by personnel.
- F. Contained PVC piping shall consist of a Schedule 80 grey PVC carrier pipe, contained within a Schedule 40 clear PVC containment pipe. Contained piping shall be an engineered modular piping system, in accordance with the following requirements:
 - 1. Piping diameters shall be as shown on the Contract Drawings.
 - 2. All contained piping and fittings shall be by the same manufacturer.
 - 3. Piping system shall have a pressure rating of at least 150 psi.
 - 4. Contained PVC piping shall be NSF 61 approved.
 - 5. Pipe joints shall be solvent welded. Solvent cement shall be compatible with the chemicals being carried.
 - 6. Contained piping shall be Double-See, as manufactured by Georg Fisher, Pro-Lock PVC as manufactured by Asahi/America Inc., or equal.
 - 7. Contained piping shall be installed in strict accordance with the manufacturer's instructions.
 - 8. The carrier pipe shall be pressure tested as specified in this Section. In addition, the containment piping shall be either pneumatically tested to 5 psi or hydrostatically tested to a pressure of 50 psi for a period of 30 minutes. If pneumatically tested, there shall be no allowable drop in pressure. Under hydrostatic test there shall be no visible leakage. Completely drain and dry the containment piping after testing.

2.04. MATERIALS - STEEL

- A. Steel Piping, Screwed or Flanged - Shall be a commercial wrought steel pipe; schedule number as stated in the piping schedule in Article 3.05. Joints of this pipe shall be screwed or with screwed-on flanges. Fittings shall be in accordance with the schedule of the pipe in which these fittings are used. Malleable iron screwed fittings, conforming to American Standard 150 lb., ANSI B163, black or galvanized, may also be used. All black and galvanized steel pipe, except that for bending, shall conform to ASTM A120. Steel pipe for bending shall conform to ASTM A53, with galvanizing where specified, in conformance with ASTM A120.

2.05. MATERIALS - COPPER

- A. Copper Pipe - ASTM B88, Type L material for inside service.
- B. Fitting shall be socket-type fittings in conformance with ASME/ANSI B16.18.
- C. Joints - Copper joints shall be soldered with a lead free solder conforming to ASTM B32.

2.06. JOINTS IN PIPING

- A. Flanged Joints
 - 1. Shall be brought to exact alignment and all gaskets and bolts or studs inserted in their proper places.
 - 2. Bolts or studs shall be uniformly tightened around the joints.
 - 3. Where stud bolts are used, the bolts shall be uniformly centered in the connections and equal pressure applied to each nut on the stud.
 - 4. Pipes in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot.
 - 5. Gaskets shall be ring type, minimum 1/16-inch thick, cloth inserted rubber gaskets.
 - 6. 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.
 - 7. For bolt sizes and lengths, the Handbook of Cast Iron Pipe should be consulted.
 - 8. Each flanged joint shall have a bead of silicone caulk applied to the full perimeter of the joint after finish painting is completed.
 - 9. Bolts and hardware shall be fluoropolymer coated, high strength, low alloy steel in accordance with AWWA C-111.
- B. Screwed Joints
 - 1. 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.

2. 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.
3. Wrenches on valves and fittings shall be applied directly over the joint being tightened.
4. Pipe in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot.
5. Joints in all piping used for chlorine gas lines shall be made up with glycerine.
6. Joints in plastic piping shall be made with compounds recommended by the manufacturer.

C. Soldered Joints

1. 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.
2. 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.
3. Joints shall be heated and solder applied until it shows uniformity around the end of joints between fitting and pipe.
4. All joints shall be allowed to self-cool to prevent the chilling of solder.
5. Combination flux and solder paste manufactured by a reputable manufacturer is acceptable.

D. Welded Joints

1. Shall be made by competent operators in a first-class workmanlike manner, in complete accordance with ANSI Standard B31.1. Welding electrodes shall conform to ANSI Standard W3.1, and welding rod shall conform to ANSI Standard W3.2.
2. Only skilled welders capable of meeting the qualification tests for the type of welding which they are performing, shall be employed.
3. Tests, if ordered by Engineer or otherwise required, shall be made at the expense of the Contractor.

E. Solvent Welded Joints

1. Joints 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.
2. Care shall be taken that no droppings or deposits of adhesive or solvent material remain inside the assembled piping.
3. Solvent material shall be compatible with the pipe itself, being a product approved by the pipe manufacturer.

4. Solvent cement for PVC piping shall be resistant to the chemicals carried by the PVC piping for which it is being used and shall conform to ASTM D2564 or other applicable ASTM specifications.
 5. Contractor shall submit written certification from the solvent cement manufacturer that the cement is compatible with the chemicals carried by the PVC piping for which it is being used. Certifications are not required for PVC pipe carrying water or organic polymers. Certification shall be supplied prior to the use of the cement.
- F. 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 C564.

2.07. OUTSIDE COATINGS

- A. All exposed steel and cast or ductile iron piping shall receive a rust-inhibitive shop primer plus cover coats in accordance with Section 09900.
1. Surfaces to be painted shall be prepared in a workmanlike manner with the objective of obtaining a smooth, clean and dry surface.
 2. Rust, dust, scale, oil, grease, as well as all other loose or foreign substances, including weld blisters, fins, and burrs shall be removed by cleaning, wire brushing, chipping, or sandblasting.
 3. To prevent new rusting, cleaned surfaces shall be painted immediately after cleaning.
 4. Surfaces located within 2 inches of joints which are to be field welded shall be left unpainted.

2.08. 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.

2.09. SLEEVES

- A. All piping passing through walls and floors shall be installed in sleeves or wall 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.
 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 and on all sleeves penetrating walls of areas designed on the Drawings as "gastight."
 3. Sleeves shall be black steel pipe, or fabricated steel in accordance with details shown on the Drawings.
 4. If not shown on the Drawings, the Contractor shall submit to the Engineer the details of the sleeves he proposes to install.

5. Steel sleeves shall be fabricated of structural steel plate in accordance with the standards and procedures of AISC and AWS.
6. All steel wall and floor sleeves shall receive a commercial sandblast cleaning, and all surfaces shall be painted in accordance with Section 09900.
7. 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 type seal consisting of interlocking synthetic rubber links connected by stainless steel bolts and nuts with pressure plates under each end.
8. Tightening the bolts shall compress the neoprene 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.
9. Seal type, size and installation thereof shall be in strict accordance with the manufacturer's recommendations.
10. 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.
11. Refer to standard details as shown on the Drawings for wall, floor and deck sleeve details.

2.10. COUPLINGS AND ADAPTERS

- A. Flanged adapters shall be used to join process piping to all pump flanges and where shown on the Contract Drawings. Dismantling joints shall be used at piping connections to equipment where shown on the Contract Drawings.
 1. Couplings, flange coupling adaptors, and dismantling joints shall be restrained, unless otherwise shown on the Contract Drawings.
 2. Dismantling joints shall be restrained to process piping by the use of tie rods.
 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 detail shown on the Drawings.
 4. Couplings and flange adaptors shall be fusion bonded epoxy coated, NSF 61 certified.
 5. Gaskets shall be NSF 61 certified.
 6. Bolts and nuts shall be fluoropolymer coated, high strength, low alloy steel bolts and hardware in accordance with AWWA C-111.
 7. Unions shall be provided adjacent to all pumps, tanks, valves and other pieces of equipment where soldered or screwed joints are utilized
 8. Where couplings and adapters are to be used they shall be installed in complete accordance with the manufacturer's recommendations.

Application	Manufacturer
Dismantling joints for ductile	Smith-Blair 975, Romac Industries Inc. Model DJ400, or equal
Restrained flange adapters for ductile	Smith-Blair 911, Romac Industries Inc. Model RFCA400, or equal
Couplings suitable for pipe material	Smith-Blair 411, Romac Industries Inc. Series 400 or Macro HP; or equal

2.11. PIPE ACCESSORIES

- A. Fittings - Same materials, class, coatings and linings as pipe unless under Article 2.02 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.

2.12. 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.

PART 3 EXECUTION

3.01. 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. 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.
 - a. 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. INSTALLATION

- A. All piping shall be installed by skilled workmen in accordance with the best standard practice for piping installation, and in accordance with the manufacturer's installation instructions where applicable.

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. 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 assemblies under 4-inch size shall be essentially supported on walls and ceilings, unless otherwise shown on the Drawings, being kept clear of openings and positioned above "headroom" space; where practical, such piping shall be run in neat clusters, plumb and level along walls, and parallel to overhead beams.

3.03. TESTING

- A. All piping shall be tested in accordance with the procedures outlined below as required in the piping 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.

2. When no test method for inside process pressure piping is specified in the pipe schedule, the following procedure shall be used.
3. 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 two hours.
4. A leakage test shall be conducted concurrently with the pressure test. The section tested shall be driptight with no signs of leakage.
5. 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.
6. All water for tests shall be furnished and disposed of by the Contractor at his expense.
7. The source and quality of water which the Contractor proposes to use in testing the lines shall be acceptable to the Engineer.
8. 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. STERILIZATION

- A. All pipe and fittings connected to and forming part of a potable water supply system shall be sterilized in accordance with Section 02675.

3.05. INSIDE PROCESS PIPING SCHEDULE

Pipe No.	Identity	Predominant Size	Type of Pipe	Schedule or Class	Joints	Testing Procedure Type
1	Raw Water	6", 8"	DIP	53	Flanged	B
2	UV Treated Water	6", 8"	DIP	53	Flanged	B
		3/4", 1"	Copper	Type L	Solder	B
3	Drain	2"	PVC	80	Solvent welded	None
4	Analyzer Supply	1/2"	Copper	Type L	Solder	C
5	Natural Gas	1/2", 1"	Steel	40	Threaded	A
6	Sodium Hypochlorite	1/2" x 2"	Contained PVC	80	Solvent welded	B
7	UVT Analyzer Supply	1/2"	Copper	Type L	Solder	C

END OF SECTION

SECTION 15100

INSIDE PROCESS VALVES AND HYDRANTS

PART 1 GENERAL

1.01. WORK INCLUDED

- A. Furnishing the several types of valves and backflow preventers.
- B. Valve operators.
- C. Installation.
- D. Testing.

1.02. RELATED SECTIONS

- A. Section 01026 - LUMP SUM ITEMS: Requirements applicable to lump sum prices for the work of this section.
- B. Section 01039 - COORDINATION
- C. Section 01300 - SUBMITTALS
- D. Section 01640 - EQUIPMENT-GENERAL
- E. Section 02675 - DISINFECTION OF WATER DISTRIBUTION SYSTEMS
- F. Section 09900 – PAINTING
- G. Section 11390 – UV DISINFECTION EQUIPMENT
- H. Section 15060 - INSIDE PROCESS PIPING

1.03. REFERENCES

- A. ANSI/AWWA C500 - Gate Valves for Water and Sewerage Systems
- B. ANSI/AWWA C504 - Rubber Seated Butterfly
- C. ANSI/AWWA C510 - Backflow Prevention Devices - Double Check Valve Types
- D. ANSI/AWWA C507 - Ball Valves 6 inches through 48 inches
- E. ANSI/AWWA C508 - Swing Check Valves for Waterworks Service 2 inches through 24 inches NPS
- F. ANSI/AWWA C509 - Resilient-Seated Gate Valves for Water and Sewerage Systems
- G. ANSI/AWWA C511 - Backflow Prevention Devices – Reduced Pressure Principle
- H. ANSI/AWWA C540 - Power-Activating Device for Valves and Sluice Gates

- I. ANSI/AWWA C550 - Protective Interior Coatings for Valves and Hydrants
- J. ASTM A126 - Gray Iron Castings
- K. ASTM A48 - Gray Iron Castings for Valves, Flanges and Pipe Fittings

1.04. DESIGN REQUIREMENTS

- A. The design working pressure shall be 200 psig for valves 12 inches NPS in diameter and smaller.
- B. The design working pressure shall be 150 psig for valves 16 inches NPS in diameter and larger.
- C. Valves shall be required for normal cold water use.
- D. Gate valves shall be designed to be leak-tight with full pressure on either face with no pressure on the opposite face.
- E. Resilient seated gate valves shall be designed to be leak-tight with full pressure on either face with no pressure on the opposite face.
- F. Deck hydrants shall be designed for a 300 psig test pressure and 150 psig working pressure.
- G. All valves shall be compatible with all the materials the valves shall be exposed to.

1.05. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit shop drawings of types of valves, hydrants and appurtenances proposed for the project including conformance to ANSI/AWWA codes and related details for field assembly, operations and maintenance.
- 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. Motor Actuators - For those valves with motors and actuators, submittals shall include the following:
 - 1. Submit product data to confirm compliance with these specifications.
 - 2. Indicate dimensions and orientation of motor and actuators. Contractor shall coordinate with manufacturer to orient equipment to avoid conflicts with existing facilities.
 - 3. Electrical and controls wiring requirements.
 - 4. Operation and maintenance data in accordance with Section 01640.

1.06. COORDINATION

- A. Coordinate work under provisions of Section 01039.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Valve size, type of valve, joint type, class, lining, coatings shall be installed as shown on Drawings.
- B. 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.
- 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. All valves shall be provided with flange or screwed ends as shown on the Drawings or described herein.
- E. Valves 2 inches in nominal diameter and smaller shall be all brass or bronze unless thermoplastic valves are specifically called for in the specifications or drawings or are required for the given service.
- F. Valves over 2 inches in nominal diameter shall be iron bodied, fully brass or bronze mounted unless thermoplastic valves are specifically called for in the specifications or drawings or are required for the given service.
- G. All surface forming joints or bearing surfaces shall be machined to a perfect fit.
- H. 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.
- I. 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. All valves shall be certified lead-free.
- M. All flange joints shall be provided with fluoropolymer coated, high strength, low alloy steel bolts and hardware in accordance with AWWA C-111.

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 B100; Hammon Figure 1B640; or equal.

- C. All other interior gate valves shall be resilient seated gate valves as specified in Article 2.03.

2.03. RESILIENT SEATED GATE VALVES

- A. Resilient seated gate valves shall conform to all applicable provisions of Articles 2.01 and 2.02 of this section.
- B. All resilient seated gate valves shall provide a full pipe opening when fully opened.
- C. Resilient seated gate valves shall conform to AWWA Standard C509.
- D. All interior gate valves shall be equipped with handwheel operators unless otherwise specified. Handwheel or chain and wheel operators shall be replaceable with 2-inch operating nuts without replacing the valve stem or removing the bevel gears.
- E. All resilient seated gate valves shall be as manufactured by Kennedy Valve Manufacturing, Mueller, or equal.

2.04. BUTTERFLY VALVES

- A. All butterfly valves shall be cast iron bodied flanged end with a resilient rubber seat.
- B. Provide lever actuators for valves 8 inches and smaller, self-locking traveling nut actuators with handwheel operators for valves 10-inch and larger, unless otherwise specified herein or shown on the Contract Drawings or unless chain and wheel operators are required per subsequent Articles.
- C. Provide electric actuators where shown on the Contract Drawings, as specified herein.
- D. All butterfly valves shall have:
 - 1. Cast iron bodies.
 - 2. Cast iron vanes conforming to ASTM A126, Class B with stainless steel Type 316 seating edge, or cast iron vanes conforming to ASTM A48 Class 40 with stainless steel Type 316 seating edge.
 - 3. Full-length Type 316 stainless steel valve shafts with permanently-lubricated nylon or teflon bearings.
 - 4. Non-wafer-type flanged end construction.
 - 5. 150 psi minimum working pressure.
 - 6. Resilient rubber seats of Buna-N compound.
 - 7. Design and construction complying with AWWA Standard C504.
 - 8. Manual actuators as specified; lever actuators for valves 8 inches and smaller shall be ratchet type.
 - 9. Valve position indicators.
- E. Butterfly valves shall be as manufactured by DeZurik, Pratt, or equal.

2.05. CHECK VALVES

- A. Check valves shall be of the silent operating type that begins to close as the forward flow diminishes and fully close at zero velocity, preventing flow reversal and resultant water hammer.
- B. Check valves shall be certified to NSF/ANSI 61, Drinking Water System Components – Health Effects, and be certified to be Lead-Free in accordance with NSF/ANSI 372.
- C. Silent check valves shall have flat faced flanges in accordance with ASME B16.1 for Class 125 or Class 250 iron flanges.
- D. The valve design shall incorporate a center guided, spring-loaded disc and have a short linear stroke that generates a flow area equal to the nominal valve size. The operation of the valve shall not be affected by the position of installation. The valve shall be capable of operating in the horizontal or vertical positions with the flow up or down.
- E. All component parts shall be field replaceable without the need of special tools. The spring shall be designed to withstand 100,000 cycles without failure and provide a cracking pressure of 0.5 psi. The valve disc and seat shall have a seating surface finish of 16 micro-inch or better to ensure positive seating at all pressures. The leakage rate shall not exceed the allowable rate for metal seated valves allowed by AWWA Standard C508 or 1 oz (30 ml) per hour per inch (mm) of valve diameter.
- F. Globe and wafer valve bodies shall be constructed of ASTM A126 Class B cast iron for Class 125 and Class 250 valves. Globe and wafer seat and disc shall be ASTM B584 copper alloy C87600 lead-free bronze. Globe and wafer compression spring shall be ASTM A313 Type 316 stainless steel.
- G. Silent check valves shall be Series 1800 (Lead Free) as manufactured by Val-Matic Valve and Manufacturing Corp., Model 402BT as manufactured by Flomatic Corp.; or equal.

2.06. THERMOPLASTIC BALL VALVES

- A. Thermoplastic ball valves shall be provided on sodium hypochlorite and other PVC lines.
- B. All thermoplastic ball valves furnished shall be of the true union-full bore design and manufactured of PVC material with teflon seats and FPM (Viton) seals.
- C. All thermoplastic ball valves shall be equipped with snap on, snap off handles.
- D. Thermoplastic ball valves shall be designed for sodium hypochlorite use and shall be provided with a drilled ball to relieve pressure.
- E. Manufacturers - Asahi, Hayward, or equal.

2.07. PRESSURE REDUCING, RELIEF, AND REGULATING VALVES

- A. Pressure reducing, relief, and regulating valves shall be installed where shown on the Contract Drawings.
- B. Each valve shall be provided with “Y” strainer as specified hereinafter.
- C. All valves provided shall be designed such that repairs can be made without the valve being removed from the line.

D. The General Contractor shall coordinate with equipment suppliers for required pressure settings where these valves are to be used for seal water.

E. Metallic Valves

1. Pressure reducing, relief, and regulating valves shall have cast iron bodies and covers, with bronze trim, with valve opening to be at least as large as the size of valve.
2. Each valve shall automatically reduce a constant or variable higher inlet pressure to a constant lower downstream pressure by means of pilot operated regulator, with the downstream pressure being adjustable by means of a single screw. The pilot system shall be bronzed-bodied and be protected by a sedimentation chamber and bronze bodied strainer.
3. Pressure reducing, relief, and regulating valves shall have a maximum pressure rating of at least 175 psi.
4. These valves shall be manufactured by G.A. Industries, Inc., Mars, PA; Cla-Val Company, Newport Beach, CA; Ross Valve Manufacturing Company, Troy, NY; or equal.
5. Pressure reducing valves (low pressure-rated) shall be designed to provide precision pressure regulation at low reduced pressures. They shall have a maximum reduced pressure rating of 20 psi. Initial pressure setpoint shall be 10 psi. Low pressure-rated valves shall be lead-free brass with a replaceable stainless steel seat, integral stainless steel strainer, and have a working pressure of 300 psi. Valves shall be capable of passing a water flow rate of at least 0.5 gallons per minute. Valves shall be Watts Series LF215, or equal.

F. Thermoplastic Valves

1. Pressure reducing, relief, and regulating valves shall have PVC bodies and covers with valve opening to be at least as large as the size of the valve.
2. Each valve shall automatically reduce a constant pressure or variable higher inlet pressure to a constant lower downstream pressure by means of a pilot-operated regulator, with the downstream pressure being adjustable by means of a single screw. The pilot system shall be PVC bodied and be protected by a sedimentation chamber and a PVC strainer as manufactured by Plast-O-Matic, Hayward, Asahi, or equal.
3. Pressure reducing, relief, and regulating valves shall have a maximum pressure rating of at least 150 psi.
4. These valves shall be manufactured by Plast-O-Matic, Hayward, or equal.

2.08. AIR RELEASE VALVES

- A. Air release valves shall be installed where shown on the Drawings.
- B. A brass shutoff valve shall be installed on all connections between the air relief valves and the pressure mains.
- C. Air release valves shall be designed for use with clean water and shall be NSF 61 certified.

- D. Air release valves shall be designed to automatically release air pockets that collect at the high points of pressurized pipelines. Air release valves shall be designed in accordance with the following requirements
 - 1. Air release valves on UV treated water pipelines shall be designed to operate at a system pressure of 100 to 150 psi. The normal operating pressure is approximately 120 psi. The orifice size shall be 1/8-inch.
 - 2. The body and cover shall be cast iron; floats shall be Type 316 stainless steel; protective hood shall be steel; seats shall be Buna-N; and miscellaneous internal parts of stainless steel or bronze.
 - 3. Air release valves shall be compound lever type.
- E. Manufacturer - APCO Valve and Primer Corp., Valmatic Valve and Manufacturing Corp, or equal.

2.09. BACKFLOW PREVENTER

- 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.

2.10. GLOBE VALVES

- A. All globe valves shall be of suitable design to provide the full pipe opening and to operate with full pressure on either side of the seat.
- B. Valves shall be of the inside screw-type seat with yoke to insure square seating of the disc.
- C. Globe valves shall be provided with the normal composition disc of a material suitable for treated water.
- D. Metallic Valves
 - 1. Shall be equipped with cast iron handwheels and shall be packed ready for use.
 - 2. Globe valves for the waterseal piping system shall be bronze bodied as manufactured by Powell; Lunkenheimer; or equal.

2.11. PRESSURE RELIEF VALVES

- A. Pressure relief valve shall be globe (angle) body type with threaded end connections.
- B. Design of the valve shall be such as to prevent excessive pressure in the main line.
- C. The valve pressure setting shall be adjustable by means of an adjusting screw.
- D. Valve body, pilot valve, diaphragm cover, diaphragm, and stem shall be constructed of bronze conforming to ASTM B62.
- E. Valve shall have stainless steel trim. Spring shall be Type 304 stainless steel.
- F. The valve shall be designed to operate under the following pressures:
 - 1. Normal Inlet Pressure, Static - 100 psi.
 - 2. Normal Inlet Pressure, Dynamic (Pumps Running) - 120 psi.
 - 3. Initial Pressure Relief Setting - 140 psi.
 - 4. Outlet Pressure - 25 psi.
- G. Valve shall be 2-inch diameter.
- H. Pressure relief valve shall be installed with a tapping saddle on the main line and isolation valve between the main and pressure relief valve.
- I. Valve shall be Model 20WR as manufactured by Ross Valve Manufacturing Co., Inc. or equal.

2.12. SADDLES

- A. Saddles shall be of double strap design.
- B. Contractor shall verify the outside diameter and pipe material ahead of time.
- C. Saddle body shall be made of either brass or bronze. Saddle straps, bolts, and hardware shall be made of silicon bronze.
- D. Saddles shall be rated for a working pressure of 200 psi.
- E. Saddles shall be as manufactured by Romac Industries Inc., Mueller Company, Ford Meter Box Company, or equal.

2.13. HANDWHEEL OPERATOR

- A. Valves specified with handwheel operator shall have the proper size handwheel to provide an effortless operation.
- B. Handwheels shall be made of bronze or cast iron materials, and shall be properly secured to the valve stem to prevent displacement during use.

2.14. ELECTRIC ACTUATORS

- A. Valve actuators shall conform to AWWA Standard C540, be reversible, designed for 120 volt, 1 phase, 60 Hertz service. The actuator shall consist of an electric motor, worm gear reduction, position encoder, electronic torque sensor, mechanically and electrically interlocked reversing motor contactor, electronic control, protection, and monitoring package, manual override hand wheel, valve interface bushing, graphical Liquid Crystal Display (LCD), and local control switches all contained in a double O-ring sealed enclosure that is sealed to NEMA 4, 4X, 6, and IP68 to 7M for 72 hours. Actuator design life shall be at least 1 million drive sleeve turns. The actuator shall include a removable drive sleeve to mate with the quarter turn valve. Motor and actuator shall be self-contained unit, including all starting capacitors.
- B. Actuators shall include local controls for open and close commands and a Local/Stop/Remote mode selector switch. Selector switch shall be lockable in any position.
- C. Actuators shall provide an LCD digital display capable of indicating continuous valve position (percent). The indication shall be in step with the actuator at all times in both handwheel and motor operation. The LCD shall be functional without main power supply by means of an onboard power source, for a minimum of one year without main power supply. The LCD should also indicate real time torque (in percent of rated torque), alarm, and configuration information.
- D. Actuator gearing shall be total enclosed in an oil-filled gear case, suitable for operation at any actuator angle. Grease-lubricated gearing is not acceptable. The design shall be so as to permit opening the gear case for inspection without releasing the stem thrust or taking the valve out of service. For quarter-turn valves, the actuator gearing shall be self-locking to prevent the valve backdriving the actuator.
- E. The actuator shall be capable of 1,200 starts per hour and enable the following remote monitoring and control from the UV control panel, at a minimum:
 - 1. Analog position control via a 4-20 mA signal.
 - 2. Position indication via a 4-20 mA signal.
 - 3. Closed indication.
 - 4. Actuator fault.
 - 5. Actuator in Hand.
- F. Motors shall be high torque design, Class F insulation with a maximum continuous temperature rating of 15 degrees rise plus ambient for duty cycle specified with adjustable torque control.
- G. Motor shall be of sufficient size to open and close the valve at the maximum operating conditions within an adjustable time span. The quarter-turn gear box shall be specifically designed for motorized operation and comply with the latest AWWA standards. Gearing shall be designed with a minimum backlash in the gear set to limit any chatter or vibration due to fluctuating or reversing-type loads. Adjustable mechanical stops shall be supplied to prevent movement beyond 90 degrees.
- H. Motor shall be independent of gearing to allow for ease of maintenance.

- I. The motor shall be equipped with internal motor winding protectors (automatic reset). Should the valve become jammed in the closed position, a timing circuit shall de-energize the motor after a maximum of 10 seconds and provide an alarm.
- J. Limit switches shall be an integral part of the valve control. Digital limit contacts shall be NEMA Form C with rating designated B600 and P300 or higher. Each actuator shall include four programmable indication relays for customer use. Each relay shall be user programmable for any of the following functions:
 - 1. Valve opening or closing.
 - 2. Valve moving (continuous or pulsing).
 - 3. Local or Stop selected.
 - 4. Local selected.
 - 5. Remote selected.
 - 6. Open or Close interlock active.
 - 7. ESD active.
 - 8. Motor tripped on torque in mid-travel.
 - 9. Motor tripped on torque going open.
 - 10. Motor tripped on torque going closed.
 - 11. Pre-set torque exceeded.
 - 12. Valve jammed.
 - 13. Actuator being operated by handwheel.
 - 14. Lost main power phase.
 - 15. Customer 24VDC or 120V AC supply lost.
 - 16. Battery low.
 - 17. Internal failure detected.
 - 18. Thermostat tripped.
- K. Closure time from the fully opened position shall be 30 seconds per foot of throat diameter and shall be field adjustable.
- L. Double Sealed Terminal Compartment and Terminal Block - Connections shall be located in a terminal chamber that is separately sealed from all other actuator components. Site wiring shall not expose actuator components to the environment.
- M. Factory wiring shall be such that only connection of power supply, remote control, and digital communication card (if utilized) is required.

- N. The control module shall be complete including limit switches, torque switches, contactors, starting capacitors, thermal overload devices, modulating controllers (where modulating service is specified), provisions for remote control and indication. 24 volt DC controls shall be provided by an internal power transformer.
- O. Actuators shall allow for both automatic position control via a 4-20 mA signal from the UV control panel, and manual position control via an integral reversing contactor and control transformer. An auxiliary handwheel shall be provided for valve operation during loss of power. All actuators shall provide position feedback to the UV control panel.
- P. A handwheel shall be provided to operate the valve upon power or motor gearing failure, operating in a clockwise to close manner. The actuator's Hand operation selector level shall be padlockable in either the Hand or Auto modes. Operation of the handwheel during a power failure shall not cause the actuator to lose position control.
- Q. The actuator shall be proof of design tested and performance tested and supplied with test certificates in accordance with AWWA C540. Testing shall be coordinated by the valve supplier or manufacturer for actuators on new valves.
- R. Actuators shall be manufactured by Rotork, Limitorque, or equal.
- S. The services of a manufacturer's direct employee shall be provided for the Preliminary and Functional Field Testing of the actuators in accordance with Section 01640.
- T. Valve actuators shall be provided with a five-year warranty.

2.15. VALVE TAGS AND DIRECTORY

- A. Provide valve tags for all valves.
- B. Tags shall be made from a plastic laminate of heavy plastic with a brass eyelet in the corner and shall indicate 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, Connecticut; W.H. Brady Company; or equal.
- E. A valve directory shall be provided listing all valve numbers, the valve function, and location. The directory shall be typewritten and framed with a glass cover and delivered to the Owner after approval by the Engineer.
 - 1. Include buried valves in the valve directory.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that structures are complete and ready to receive work.
- B. All valves, deck hydrants and appurtenances shall be carefully inspected in the field before installation. 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. Such 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.

- C. The Contractor shall have on the job site all the proper tools, gauges, pipe cutters, lubricants, etc., to properly install valves, deck hydrants, etc.
- D. The Contractor shall verify all valve positions and locations before installation.

3.02. TOLERANCES

- A. Valves, backflow preventers and appurtenances shall be installed at the elevations and locations shown on the Drawings.

3.03. INSTALLATION

- A. 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.
- B. The valves or deck hydrants shall not be dropped from trucks onto the ground.
- C. 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.
- D. Joints of valves shall be made up in accordance with the Drawings and/or as described under the appropriate pipe joint descriptions found in other sections of these specifications.
- E. 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.
- F. All valves shall be inspected before installation, and they shall be cleaned and well lubricated before being installed in the line.
- G. Deck hydrants shall be set at locations specified on the Drawings.
- H. All iron bodied valves shall be primed and finish painted in accordance with Section 09900.

3.04. PRESSURE AND LEAKAGE TEST

- A. All installed valves, hydrants and appurtenances shall be subjected to the pressure and leakage test as described under Section 15060.

3.05. DISINFECTION OF WATER VALVES AND HYDRANTS

- A. All installed water valves, deck hydrants and potable and non-potable water appurtenances shall be subjected to the flushing, sterilization and coliform tests described under Section 02675.

END OF SECTION

SECTION 15140
SUPPORTS AND ANCHORS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Piping and equipment hangers and supports.
- B. Equipment bases and supports.
- C. Inserts.
- D. Schedules.

1.02. RELATED SECTIONS

- A. Section 01640 - EQUIPMENT-GENERAL
- B. Section 05500 - MISCELLANEOUS FABRICATIONS
- C. Section 09900 - PAINTING
- D. Section 15060 - INSIDE PROCESS PIPING
- E. Section 15100 - INSIDE PROCESS VALVES AND HYDRANTS

1.03. REFERENCES

- A. ASME B31.1 - Code for Pressure Piping (Power Piping)
- B. ASME B31.2 - Fuel Gas Piping
- C. ASME B31.5 - Refrigeration Piping
- D. ASME B31.9 - Building Services Piping
- E. ASTM F708- Design and Installation of Rigid Pipe Hangers
- F. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
- G. MSS SP69 - Pipe Hangers and Supports - Selection and Application
- H. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices
- I. NFPA 13 - Installation of Sprinkler Systems
- J. NFPA 14 - Installation of Standpipe and Hose Systems
- K. UL 203 - Pipe Hanger Equipment for Fire Protection Service
- L. 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.

1.05. REGULATORY REQUIREMENTS

- A. Conform to applicable code for support of plumbing piping.
- B. 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 and as specified herein.

2.02. MATERIALS

- A. Stainless Steel - For the purpose of this section, all stainless steel shall be Type 316.
- B. 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. 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 coating shall be applied by the liquid plastisol method.

5. The plastisol shall be compounded of pure materials and shall be free of any fillers or secondary plasticizers.
 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 mil).
 7. 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.
- C. Steel, Steel Alloys - Steel or steel alloy hangers and supports shall conform to ANSI B31.10 and MSS Standard Practice SP-58.

2.03. MANUFACTURERS

- A. Hangers and supports shall be as manufactured by Anvil International, Providence, RI; Basic Engineering (B.E.), Pittsburgh, PA; Carpenter & Patterson, Lakeport, NH; Unistrut Corporation; B-Line Systems; Globe Division of United States Gypsum; Robroy Industries; OCAL; or equal.

2.04. CORROSION RESISTANCE

- A. All pipe 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.
- B. All other areas shall have cadmium plated appurtenances unless specified otherwise.

2.05. HANGER AND SUPPORT SCHEDULE

- A. The following schedule is provided to identify the type of hangers and supports acceptable under this contract. The Contractor shall provide the type of hangers and supports in the schedule; however, the acceptable materials of construction shall be provided as identified in the Application Schedule in Article 3.06 for the various systems and the intended location of the hanger or support.

**PIPE HANGER AND SUPPORT SCHEDULE
INSIDE PROCESS PIPING**

TYPE	PIPE SYSTEM	DESIGNATION	ANVIL	BE
A	Steel	Clevis hanger	260	BE120
A	Steel, insulated	Clevis hanger	300	BE119
A	Ductile iron	Clevis hanger	590	BE174
A	PVC	Clevis hanger	65	--
B	Ductile iron, steel	Pipe stanchion saddle, pipe support and floor plate with stainless steel yoke	259	BE141
C	Ductile iron, PVC	Split pipe clamp with base flange	138R	--
D	PVC and steel	PVC coated clamp.	262	--
E	Ductile iron, steel	Pipe support in trench	--	--
F	Ductile iron	Concrete base fitting support	--	--

TYPE	PIPE SYSTEM	DESIGNATION	ANVIL	BE
G	Ductile iron, steel	Concrete pipe support	--	--
H	Ductile iron, steel	Welded steel frame	--	--
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	--	--
T	Stainless Steel	Welded steel frame	--	--

1. Type J and E pipe supports shall be an applicable channel system, for the pipe loading and Unistrut span utilized by 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 Unistrut system is adequate for weight of pipes and contents and span utilized.

HEATING AND VENTILATING PIPING

TYPE OF PIPE	INSULATED	ANVIL HANGER FIGURE NO.
Hung Piping - Stationary:		
Steel	No	260
Steel	Yes	300
Hung Piping - Subject to Movement:		
Steel	No	174
Steel	Yes	174 with saddle
Wall Supported Piping – Stationary:		
Steel	No	260 with 213, 194, 195 or 199 wall bracket
Steel	Yes	300 mounted on 213, 194, 195, or 199 wall bracket
Wall Supported Piping - Subject to Movement:		
Steel	No	175 with 213, 194, 195, or 199 wall bracket
Steel	Yes	175 with 160 saddle mounted on 213, 194, 195, or 199 wall bracket

TYPE OF PIPE	INSULATED	ANVIL HANGER FIGURE NO.
Vertical Piping Supports:		
Steel	Yes/No	261 riser clamp
Floor Supported Piping:		
	Yes	258 or 264 pipe saddle support

PLUMBING PIPING

TYPE OF PIPE	INSULATED	ANVIL HANGER FIGURE NO.
Hung Piping - Stationary:		
Steel, wrought or cast iron	No	97
Copper	No	CT-99C-plastic coated
Steel or wrought iron	Yes	97 with 167 shield
Copper	Yes	97 with 167 shield
Hung Piping - Subject to Movement:		
Steel, wrought or cast iron	No	174
Steel, wrought or cast iron	Yes	174 with saddle
Copper	Yes	174 with saddle
Wall Supported Piping – Stationary:		
Steel, wrought or cast iron	No	260 with 213, 194, 195, or 199 wall bracket
Copper	No	CT-99C and rod with 194 wall bracket
Steel or wrought iron	Yes	260 with saddle mounted on 194, 195 or 199 wall bracket
Copper	Yes	C-97 with rod and 167 shield

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 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.

3.02. 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 at the end of this section.

3.03. 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 flanged ductile iron and steel pipe 1-1/4 inches and larger shall not be more than 10 feet on center.
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 at not more than 4 feet on center horizontally and vertically, except non-metallic electrical conduit spacing shall be 3 feet on centers.
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 - Hangers and supports for steel and wrought iron pipe less than 1-1/4 inches shall not exceed 8 feet 0 inches; 1-1/4 inches and larger, 10 feet 0 inches maximum.
- E. Copper Pipe - Copper pipe 1/2-inch to 1-inch, 6 feet 0 inches maximum support spacing; 1-1/4-inch and over 10 feet 0 inches maximum.
- F. Cast Iron Pipe - Cast iron soil pipe shall be supported at each length, close to bell.

3.04. EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment. Refer to Division 3 specifications.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of steel members. Steel pipe and fittings. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05. INSERTS

- A. Provide inserts for suspending hangers from concrete slabs and sides of concrete beams.

3.06. HANGER AND SUPPORT APPLICATION SCHEDULE

AREA	ACCEPTABLE MATERIALS
EXTERIOR:	
Exposed to outdoor conditions	Stainless steel ⁽¹⁾
INTERIOR:	
Unclassified or Non-Corrosive Locations:	
Pump Station	Galvanized steel ^(1, 2)
UV Disinfection Room	Galvanized steel ^(1, 2)

(1) Uninsulated copper piping shall be provided with PVC-coated galvanized steel supports.

(2) Type B supports shall be all stainless steel construction.

END OF SECTION

SECTION 15170

MOTORS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. All electric motors supplied under these Contract Documents shall conform to this specification as minimum requirements.
- B. All electric motors shall conform to ANSI Standards for Rotating Electrical Machinery (Designation C50) and to NEMA Standards MG-1 for Motors and Generators (NEMA Standard Publication latest revision) and to NEC, Article 430.
- C. The rating of the motors offered shall in no case be less than the horsepower required in the Contract Documents.
- D. Motors shall operate without an undue noise or vibration and shall show no signs of electrical unbalance.
- E. Motor efficiency shall be a prime consideration in selection of all motors. Unless otherwise specified in the individual equipment specifications, motors shall meet the requirements of Article 1.08.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01640 - EQUIPMENT-GENERAL
- C. Section 01700 - RECORD DOCUMENTS
- D. All other sections where motors are specified or required.

1.03. SUBMITTALS

- A. Shop Drawings of Electric Motors - Submit in accordance with Sections 01300 and 01640.
- B. Include with submittals:
 - 1. Electric characteristics.
 - 2. Design characteristics.
 - 3. Mechanical construction.
 - 4. Manufacturer's name.
 - 5. Manufacturer's type.
 - 6. Pertinent specifications for the use intended.
 - 7. Name of the equipment to be driven.

C. Tabulate the following information in one location on each electric motor shop drawing submittal:

1. Motor manufacturer.
2. Model.
3. Frame number.
4. Type of enclosure.
5. Volts.
6. Hertz.
7. Phase.
8. NEMA design.
9. Code letter.
10. Locked rotor amps.
11. Locked rotor torque.
12. Nameplate horsepower.
13. Motor rpm, full load nameplate.
14. Insulation class.
15. Service factor.
16. Maximum ambient temperature.
17. Maximum temperature rise.
18. Shop painting.
19. Nominal efficiency.
20. Guaranteed minimum efficiency at 50, 75 and 100 percent full load.
21. Minimum power factor at 50, 75 and 100 percent load.
22. Resistance temperature device information (if applicable).

1.04. INSULATION

- A. Minimum NEMA Class B insulation unless otherwise noted in the individual equipment specifications.
- B. Provide Class F insulation if required by the manufacturer to meet specified energy efficiency.

- C. Use Class F or H insulation where ambient temperatures exceed 104 degrees F (40 degrees C) as shown on the Contract Drawings or elsewhere in the specifications.

1.05. RATINGS AND DESIGN

- A. Furnish with adequate ratings to accelerate and drive connected equipment under all normal operating conditions without exceeding nameplate ratings.
- B. Furnish with service factors in accordance with NEMA standards as follows unless otherwise noted in individual equipment specifications.

TYPE OF MACHINE	MINIMUM SERVICE FACTOR (SF)
Mill and chemical duty	1.15
Open drip-proof	1.15
All others	1.0
Submersible	1.15
Inverter duty	1.0

- C. Motors shall operate successfully under running conditions at rated load and frequency with a voltage variation up to 10 percent; at rated load and voltage with a frequency variation up to 5 percent; and at rated load with a combined variation in voltage and frequency not more than 10 percent above or below the rated voltage and frequency provided that the frequency variation does not exceed 5 percent.
- D. Assume voltage unbalance to be 1 percent. Altitude is less than 3,300 feet.
- E. Assume ambient temperatures to be 40 degrees C for motors in air and 25 degrees C for submersible motors.
- F. Motor winding temperature rise shall be as follows:

	CLASS OF INSULATION		
	B	F	H
Open, drip-proof motors	80°C	105°C	125°C
Totally enclosed fan-cooled motors	80°C	105°C	125°C
Totally enclosed non-ventilated motors	85°C	110°C	135°C
Explosionproof motors	80°C	105°C	125°C
All other motors with 1.15 SF or higher	90°C	115°C	--

- G. Use the applicable paragraphs of NEMA MG1 12.42 in making design selections.
- H. Unless otherwise specified, all three phase motors shall be constant speed, squirrel cage induction type.
- The Contractor shall provide multi speed (multiple windings or consequent poles - single winding, wound rotor, etc.) where required as specified in individual equipment specifications.

I. Motor Voltages

1. Motors of 1/2 HP and Larger - Squirrel cage induction type designed for 3 phase, 60 cycle, 230/460 volt operation unless otherwise specified.
2. Motors Smaller Than 1/2 HP - Capacitor type designed for single phase, 60 cycle, 120 volt operation unless otherwise specified.
3. Motors indicated on the Contract Drawings and/or specified in the specifications as 208 volt shall be specially wound for voltage indicated and/or specified.
4. Dual-rated motors (i.e., 208/230 volts) are not acceptable for operation on 208 volts.

J. Unless otherwise specified, all single-phase motors shall be NEMA design letter M or N, designed to withstand full voltage starting in accordance with MG12.32.

1. Motors shall comply with NEMA Standards for Definite Purpose Motors (paragraphs 18.001-18.717).

K. In general, capacitor start induction run or split phase type motors shall be used unless otherwise approved by the Engineer.

L. Shaded pole motors larger than 1/8 HP will not be allowed.

M. Thermal overload protectors and any auxiliary components necessary to provide required starting characteristics including capacitors, resistors and automatic switching devices shall be furnished and mounted integrally unless motor starters with overload protection are provided.

1.06. MECHANICAL CONSTRUCTION

A. Unless otherwise specified, electric motors shall be of the following types of construction according to the degree of mechanical protection:

1. Totally Enclosed, Fan Cooled (TEFC) Motors - When located outdoors or indoors in wet areas such as washdown areas or elsewhere if specified.
 - a. Winding heaters shall be provided when specified.
2. Mill and Chemical Duty or Severe Duty - Suitable for use in corrosive areas unless otherwise specified in individual equipment specifications.
3. In all other cases, they shall be open drip-proof.

B. Encapsulated Windings - Where specified, an additional "dip and bake" will not be acceptable. Encapsulation shall be Contour Mold Everseal by U.S. Motors; Costum Polyseal by General Electric; or equal.

C. Bearings

1. Unless otherwise specified or required, motors rated above 2 HP shall have the bearings of the grease lubricated, anti friction ball type with conveniently located grease fittings.

2. Provide a means of preventing bearings from becoming overgreased (such as double shields on bearings or pressure sensitive relief fittings).
 3. Unless otherwise specified, bearings shall be rated at a minimum B 10 life of 20,000 hours under axial loads.
 4. Submersible motors shall have bearings rated of an L 10 or B 10 life of minimum of 17,500 hours.
- D. Vertical shaft construction, the motors shall have adequate thrust bearings to carry all motor loads and any other operating equipment loads.
1. Grease slingers to be provided.
- E. Horizontal Shaft Construction - Coupled to fluid pumps, the motors shall either have adequate thrust bearings or they shall have the couplings end play and rotor float coordinated to prevent damage to rotor bearings.
- F. Rotors
1. Statically and dynamically balanced.
 2. Have secondary bars of heavy copper silver brazed to one piece end rings or they shall have rotor windings of one piece cast aluminum.
 3. Where applicable, construct with integral fans.
- G. Non-reversing ratchets shall be provided where specified in the individual equipment specifications.
- H. Nameplates - Stainless steel furnished with all motors, with markings in accordance with NEMA MG1, latest revision, MG1 10.38.
- I. Terminal Boxes
1. Sized in accordance with NEC, Article 430 12 and of sufficient size to accommodate conduits and conductor sizes as shown on Contract Drawings.
 2. Furnish rubber gasketed terminal boxes with splash proof and totally enclosed motors.
 3. Horizontal Motors - Locate on the left hand side, when viewing the motor from the drive shaft ends and design such that conduit entrance can be made from above, below, or either side of the terminal box.
 4. Include grounding lug in terminal box.
 5. Oversize terminal boxes in the following applications:
 - a. Motors 7-1/2 HP and larger operating at 208 or 230 volts.
 - b. Motors 20 HP and larger operating at 460 volts.
- J. Motors used with belt drives shall have grease slingers on the sheave end and sliding bases to provide for belt take up.

- K. Cast iron construction for all motors, when available for the application.

1.07. MOTOR POWER FACTORS

- A. Provide when called for on the Contract Drawings.
- B. 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.
- C. Furnish and install, at no additional cost to the Owner, the capacitors and provide all necessary wiring to connect them to the motor terminals or motor controller terminals.
 - 1. Properly size fused switch or circuit breaker to serve as a disconnect for the capacitor.
- D. Capacitor and Disconnect Enclosure
 - 1. Indoors Mounting (Non-Hazardous) - NEMA 12 wall mounted.
 - 2. Indoor Wet Areas - NEMA 4 wall mounted.
 - 3. Outdoors Mounting - NEMA 4 wall, pad, or mounting stand mounted
 - 4. Explosionproof Areas - NEMA 7 wall mounted (DS only).*
 - 5. Corrosive Areas - NEMA 4X wall mounted.*

*Locate capacitor outside the hazardous or corrosive area.
- E. Size capacitors so they do not increase the self excitation voltage above the motor nameplate rating.
- F. Do not use capacitors on motors controlled by VFDs.
- G. When used with solid-state starters, energize only after bypass or full speed bypass contactor is energized. Verify with starter manufacturer their connection requirements and follow them.

1.08. MOTOR EFFICIENCY

- A. All single speed, three phase, squirrel cage induction-type motors 1 HP or larger, 60 Hertz, shall have nominal efficiencies in accordance with attached Table 1, unless specifically otherwise specified in the respective equipment section.
 - 1. Determine efficiencies by using IEEE Test Procedure 112, Test Method B using segregated losses. Motors shall be listed by their manufacturers and be nameplated with words such as "High Efficiency," "Premium Efficient," and "Energy Saver."
 - 2. List guaranteed minimum efficiencies on motor nameplate. Adhere to the latest nominal efficiencies eligible for a rebate published by the local utility where rebates are available. hose efficiencies may be higher than those listed in Table 1.

3. Where rebates are available, submit to the Owner paid invoices for each specific motor supplied for which a rebate is being sought.

1.09. FIELD TESTING

- A. All three phase electric motors 1/2 HP and larger and all single phase electric motors 1 HP and larger shall be field tested by the Contractor at as near operating conditions as possible. Complete and submit all of the information required by the attached "Motor Test Record" for all motors to be tested per the above. Submit record prior to the issuance of the "Substantial Completion Certificate." See Section 01700. Contractor, for the purposes of this item, is the one furnishing and/or installing the final motor-driven unit.
- B. All testing shall be witnessed by the Owner.
- C. Submit completed forms in quadruplicate (one set to be submitted at the time when substantial completion is requested, and one set to be placed in each of the submitted O&M manuals).

1.10. MOTOR SHOP TESTS

- A. Perform motor shop tests in accordance with the IEEE Code for polyphase induction machines. Use NEMA report of test forms and submit results to the Engineer, in five copies, for his approval.
- B. Test each motor and submit report for power factor and efficiency at 50, 75, and 100 percent of its rated horsepower; for insulation resistance and dielectric strength; for heating; and for compliance with all specific performance requirements.
- C. For motors less than 50 HP, provide guaranteed performance data based on previous testing of the motor design. For motors of 50 HP or larger, make complete tests of each motor and furnish certified test data sheets.

1.11. VERTICAL HOLLOW SHAFT MOTORS

- A. Where specified, design vertical hollow shaft motors to carry the motors, pumps, and associated equipment's full thrust. Equip motors with oil lubricated spherical roller thrust bearings and lower grease lubricated radial guide bearings. Provide motors with visual oil level indicators and sufficient oil to fill the motor.
- B. Vertical Adjustment - By means of a lockable nut at the top of the shaft.
- C. Non-Reversing Ratchets - Provide where specified in the individual equipment specifications and where suitable for continuous operation at any speed between 50 and 100 percent of rated speed.

1.12. TWO-SPEED MOTORS

- A. Motors 1/2 HP and Larger Specified as Two Speed Motors - Two windings unless otherwise noted. Motors less than 1/2 HP will be permitted with single windings. Speeds of the motors shall be as specified. Two speed motors shall be tested at the higher speed.

1.13. PAINTING

- A. All motors shall have a manufacturer's standard shop rust-resisting priming coat. Finish coat, either shop or field applied, shall be in accordance with Section 09900.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

(continued)

TABLE 1

**NOMINAL EFFICIENCIES FOR “NEMA PREMIUM™” INDUCTION MOTORS
RATED 600 VOLTS OR LESS (RANDOM WOUND)**

HP	Open Drip-Proof*				Totally Enclosed Fan-Cooled*			
	900	1200	1800	3600	900	1200	1800	3600
1	74.0	82.5	85.5	77.0	74.0	82.5	85.5	77.0
1.5	75.5	86.5	86.5	84.0	77.0	87.5	86.5	84.0
2	85.5	87.5	86.5	85.5	82.5	88.5	86.5	85.5
3	86.5	88.5	89.5	85.5	84.0	89.5	89.5	86.5
5	87.5	89.5	89.5	86.5	85.5	89.5	89.5	88.5
7.5	88.5	90.2	91.0	88.5	85.5	91.0	91.7	89.5
10	89.5	91.7	91.7	89.5	88.5	91.0	91.7	90.2
15	89.5	91.7	93.0	90.2	88.5	91.7	92.4	91.0
20	90.2	92.4	93.0	91.0	89.5	91.7	93.0	91.0
25	90.2	93.0	93.6	91.7	89.5	93.0	93.6	91.7
30	91.0	93.6	94.1	91.7	91.0	93.0	93.6	91.7
40	91.0	94.1	94.1	92.4	91.0	94.1	94.1	92.4
50	91.7	94.1	94.5	93.0	91.7	94.1	94.5	93.0
60	92.4	94.5	95.0	93.6	91.7	94.5	95.0	93.6
75	93.6	94.5	95.0	93.6	93.0	94.5	95.4	93.6
100	93.6	95.0	95.4	93.6	93.0	95.0	95.4	94.1
125	93.6	95.0	95.4	94.1	93.6	95.0	95.4	95.0
150	93.6	95.4	95.8	94.1	93.6	95.8	95.8	95.0
200	93.6	95.4	95.8	95.0	94.1	95.8	96.2	95.4
250	94.5	95.4	95.8	95.0	94.5	95.8	96.2	95.8
300	--	95.4	95.8	95.4	--	95.8	96.2	95.8
350	--	95.4	95.8	95.4	--	95.8	96.2	95.8
400	--	95.8	95.8	95.8	--	95.8	96.2	95.8
450	--	96.2	96.2	95.8	--	95.8	92.2	95.8
500	--	96.2	96.2	95.8	--	95.8	96.2	95.8

*Nominal speed; for two-speed motors, the efficiency applies to the highest speed.

For submersible motors, other motor horsepower, speeds, and for Design C and D motors, the efficiencies shall be in accordance with the applicable equipment specification sections.

MOTOR TEST REPORT

Equipment Description _____ Equipment No. _____
Equipment Loc. _____
Drawing Nos. and Rev. _____
MCC/Panel No. _____ Section/CKT. No. _____
Control CKT. No. _____

NAMEPLATE DATA

Motor Mfr. _____ HP _____ Rpm _____ S.F. _____
Volts _____ Phase _____ F.L. Amp _____ KVA Code _____ O° Rise _____
Serial No. _____ Other _____
Locked Rotor KVA _____ Efficiency _____

Prestart Checks

Date

Lubrication Checked (Motor and Driven Equipment) _____
Motor Rotates Freely _____
Overload Heater Size/Setting _____ (located at starter) _____
Control Circuit Tested _____
Breaker Size (Frame Size/Trip Element Rating) _____
Motor Insulation Resistance (Megger) _____
Test Volts _____ (500V for up to 250V motors and 1000V for up to 600V motors)
Test Duration - 1 minute _____

Phase A to Gnd _____ Phase B to Gnd _____ Phase C to Gnd _____
Phase A to B _____ Phase B to C _____ Phase C to A _____

UNCOUPLED DATA

(Provide this only when motor is shipped, uncoupled. Do not uncouple motor from drive to test.)

Bus Voltage _____ Inrush Current _____ Amps _____ Sec Run in Time _____
Average Running Current _____ A _____ B _____ C Rotation * _____
Rpm _____ Performed by _____ Date _____
Performed by _____ Date _____
Test Engineer _____

COUPLED DATA

Bus Voltage _____ Inrush Current _____ Amps _____ Sec Run in Time _____
Average Running Current _____ A _____ B _____ C Rotation * _____
Rpm _____ System Lineup/Conditions _____

Test Equipment Control Nos. _____

Remarks: _____

Performed by _____ Date _____
Approved by _____ Date _____
Test Engineer _____

*As viewed from motor outboard end. EQUIPMENT NO. _____

END OF SECTION

SECTION 15400

PLUMBING-GENERAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. The Contractor shall furnish all labor, materials, equipment, tools, and services to install plumbing systems as specified herein and as shown on the Drawings. All materials shall be new. All work shall be subject to applicable sections of these specifications.

1.02. RELATED SECTIONS

- A. Specifications - The specification sections listed below are an integral part of this equipment specification. The Contractor shall be responsible for providing these sections to the equipment suppliers and for the provisions specified in these sections:
 - 1. Section 02223 - BACKFILLING
 - 2. Section 02228 - COMPACTION
 - 3. Section 09900 - PAINTING
 - 4. Section 15140 - SUPPORTS AND ANCHORS
 - 5. Section 15170 - MOTORS
 - 6. Section 15410 – PLUMBING–SUPPLY PIPING
 - 7. Section 15430 – PLUMBING–DRAINAGE AND VENT PIPING
 - 8. Section 15440 – PLUMBING–FIXTURES
- B. The specifications direct attention to certain required features of the equipment, but do not purport to cover all details of design and construction. Nevertheless, Contractor shall furnish the equipment complete in all details and ready for operation.
- C. Drawings - The Drawings accompanying these specifications are generally diagrammatic and do not show all details required for the complete system. They should, however, be followed as closely as possible in the general arrangement and location of piping and equipment. All dimensions shall be checked and all structural and finish conditions investigated and the Contractor shall coordinate his work with these conditions and provide such offsets, brackets and other necessary accessories as may be required. Architectural and Structural Drawings shall take precedence over the Plumbing Drawings regarding building construction, dimensions, and arrangement. Immediately upon discovery of any discrepancy in the Drawings or Specifications, or points of conflict therein, the Contractor shall notify the Engineer, who will clarify such discrepancy in writing prior to the progress of the work beyond the point concerned.

1.03. SUBMITTALS

- A. Shop Drawings - Shop drawings shall be furnished in accordance with Section 01300, Submittals, and for the listed equipment.

- B. Upon completion of the work, the Contractor shall obtain certificate(s) of inspection and approval from the inspection organization having jurisdiction and shall deliver same to the Engineer and the Owner.

1.04. REFERENCES

- A. All work, equipment and materials furnished and installed under Division 15, Plumbing, shall conform with the most recent edition of the existing rules, requirements and specifications of the following organizations:
 - 1. American National Standards Institute (ANSI)
 - 2. American Society of Testing Materials (ASTM)
 - 3. American Water Works Association (AWWA)
 - 4. The Americans With Disabilities Act (ADA)
 - 5. National Electric Code (NEC)
 - 6. National Electric Manufacturers Association (NEMA)
 - 7. National Fire Protection Association (NFPA)
 - 8. Occupational Safety and Health Association (OSHA)
 - 9. Underwriters Laboratories (UL)
 - 10. Building Code of New York State
 - 11. Fire Code of New York State.
 - 12. Plumbing Code of New York State.
 - 13. Local and State Health Code.
 - 14. New York State Department of Environmental Conservation Certified Water Saving Plumbing Fixtures
- B. All work shall be installed in compliance with the local, state and international plumbing codes. Where conflict arises between the local codes and the requirements of the National Electrical Code, the National Fire Code, NEMA, ASTM, etc., the more stringent requirements shall prevail.

PART 2 PRODUCTS

2.01. FABRICATION REQUIREMENTS

- A. Painting, including surface preparation, shall be in full accordance with Section 09900, Painting.
- B. Factory finishes on all equipment shall be maintained in good condition by the Contractor, as determined by the Engineer, clean and free from rust, abrasions and dents. Field and touch up painting will be performed by the Contractor.

PART 3 EXECUTION

3.01. COORDINATION

- A. Coordinate work with that of other trades. Provide information for setting sleeves, inserts, anchors, equipment pads, and advise appropriate trades of all opening sizes, and supply all items to be installed by other trades to them in ample time. Do not rough in equipment without an approved shop drawing.
- B. All wiring will be done by the electrical trade on the job. Advise him of all requirements in ample time. All motor starters, controllers, etc., will be provided by the electrical trade unless noted. All motors supplied with equipment shall conform to Section 15170, Motors, unless otherwise noted.

3.02. FINAL CLEANING

- A. Cleaning will be required for all equipment, fixtures, piping, and accessories including, but not limited to, the following:
 - 1. Removal and cleaning of all debris from trenches, crawl spaces, ceilings, and other unoccupied spaces.
 - 2. Removal and cleaning of all filters, strainers, drains, traps.
 - 3. Cleaning of all valve seats.
 - 4. Removal of labels, protective coatings, and wrappings.
 - 5. Removal of grease and dirt from finished surfaces.
 - 6. Removal of dents and scratches from damaged equipment.

3.03. ADJUSTMENTS

- A. Proper adjustment and inspection will be required for all equipment and systems including but not limited to the following:
 - 1. Temperature control devices.
 - 2. Miscellaneous control systems.
 - 3. All electrical work checked free from grounds.
 - 4. Piping systems air free.
 - 5. Overload protective elements for proper size.
 - 6. Check all systems for undue noise. Replace or repair as directed by Engineer.

3.04. INSTALLATION

- A. Plumbing equipment shall be installed by the Contractor in accordance with manufacturer's instructions.

- B. Equipment and piping shall be kept free of dirt. Pipe openings shall be protected by caps, plugs or other suitable means. Equipment shall be covered and protected against dirt, water and chemical or mechanical damage.

END OF SECTION

SECTION 15410

PLUMBING-SUPPLY PIPING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. The Contractor shall furnish all labor, materials, equipment, tools and services to install plumbing systems as specified herein and as shown on the Drawings. All materials shall be new. All work shall be subject to applicable sections of these specifications.

1.02. RELATED SECTIONS

The specification sections listed below are an integral part of this equipment specification, and the Contractor shall be responsible for providing these sections to the equipment suppliers:

- A. Section 09900 - PAINTING
- B. Section 15100 - INSIDE PROCESS VALVES AND HYDRANTS
- C. Section 15140 - SUPPORTS AND ANCHORS
- D. Section 15400 - PLUMBING-GENERAL

1.03. SUBMITTALS

- A. Shop Drawings - Provide shop drawings in accordance with Section 01300, Submittals, for the following equipment:
 - 1. Piping materials.
 - 2. Valves and hydrants.
 - 3. Sleeves.
 - 4. Shock absorbers.
 - 5. Pressure gauges
 - 6. Supports and anchors.

PART 2 PRODUCTS

2.01. PIPING MATERIALS

- A. Steel Piping, Screwed or Flanged - Shall be a commercial wrought steel pipe, schedule number as stated in the piping schedule of these specifications. Joints of this pipe shall be screwed or with screwed-on flanges. Fittings shall be in accordance with the schedule of the pipe in which these fittings are used. Malleable iron screwed fittings, conforming to American Standard 150 lb., ANSI B163, black or galvanized, may also be used. All black and galvanized steel pipe, except that for bending, shall conform to ASTM A120. Steel pipe for

bending shall conform to ASTM A53, with galvanizing where specified, in conformance with ASTM A120.

- B. Type L Copper Piping - Shall conform to ASTM B88. Solder fittings shall be of red brass, conforming to ASTM D145, or shall be wrought copper.
- C. Chlorinated Polyvinyl Chloride (CPVC) Piping - Shall be manufactured in accordance with ASTM D1784 and D1785, normal impact, Schedule 80 as stated in the piping schedule. Fittings used shall be screwed or solvent joint type as stated in the piping schedule. All CPVC piping used for potable water service shall be NSF approved. The piping shall be installed in strict accordance with the manufacturer's recommendations for the specific installation. No field bending or distortion of the piping will be permitted. Fittings shall conform to the following standard specifications:
 - 1. Screwed Type - Schedule 80, ASTM D2464.
 - 2. Solvent Type - Schedule 80, ASTM D2467.

2.02. PIPING SCHEDULE

- A. Provide piping in accordance with the following schedule or as otherwise noted on the Drawings:

APPLICATION	SIZES	PIPE	JOINT
Water (potable and plant water)*	3" or less	L copper	Soldered
Water (potable and plant water)	3" or less	CPVC Schedule 80	Solvent

*All piping shall be Type L copper pipe unless shown otherwise on the Contract Drawings.

2.03. VALVES AND HYDRANTS

- A. All valves and hydrants shall be provided in accordance with Section 15100, Inside Process Valves and Hydrants, and shall be rated for 125 psi working pressure minimum unless otherwise noted. Provide the type valve as shown on the Drawings or required by the specifications. Manufacturer's numbers as listed or approved equal. Valves and hydrants shall be constructed of brass or bronze unless otherwise noted.

2.04. SLEEVES

- A. All piping passing through walls and floors shall be installed in sleeves accurately located before concrete is poured, or placed in position during construction of masonry walls. Pipe sleeves, except for those passing through structural members, shall be 12 gauge galvanized iron. Pipe sleeves passing through structural members shall be Schedule 40 steel. Sleeves passing through floors shall extend from the bottom of the floor to a point 3 inches above the finished floor, unless shown otherwise. All steel wall and floor sleeves shall receive a commercial sandblast cleaning and only surfaces not in contact with concrete shall be painted, in accordance with Section 09900, Painting.
- B. Watertight sleeves shall be furnished for all pipes passing through floors or walls which are continually wet or under hydrostatic pressure on one or both sides of the floor or wall or for pipes passing through floors or walls below grade.
- C. Sleeves shall be in accordance with details shown on the General Drawings. If not shown on the Drawings, the Contractor shall submit to the Owner the details of the sleeves he proposes

to install, and no fabrication or installation thereof shall take place until the Owner's approval is obtained.

- D. 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 type seal consisting of interlocking synthetic rubber links connected by stainless steel bolts and nuts with pressure plates under each end. Tightening the bolts shall compress the neoprene lines causing them to expand and form a continuous, air tight, watertight seal between pipe and sleeve. The seal shall be "Link Seal" as manufactured by the Thunderline Corporation, Wayne, MI; Innerlynx; or equal. Seal type, size, and installation thereof shall be in strict accordance with the manufacturer's recommendations. In general, sleeves installed in walls or floors against one side of which will develop a hydrostatic or gas pressure, or through which leakage of liquid will occur, shall be so sealed. Seals shall be provided for all piping passing through walls between hazardous and non hazardous. Refer to standard details as shown on the Drawings for wall, floor, and deck sleeve details.
- E. Sleeves through fire/smoke walls and floors shall be installed per NFPA and seal all cracks and voids with fireproof sealant.

2.05. SHOCK ABSORBERS

- A. Provide shock absorbers for all branch lines, sized and installed according to the Plumbing and Drainage Institute "Standard P.D.I. WH201" using the fixture unit method. Shock absorbers shall be stainless steel shell, elastomer bellows and orifice type. Smith "Hydrotrol" Series 5000, Josam 1485 Series; Zurn; or equal. Intent of this specification is to provide shock absorbers for all branch lines where equipment or fixtures are located whether shown on the Drawings or not.

2.06. VALVE TAGS AND DIRECTORY

- A. Provide valve tags and directory in accordance with Section 15100, Inside Process Valves and Hydrants.

2.07. FABRICATION

- A. Painting, including surface preparation, prime and finish coats, shall be in accordance with Section 09900, Painting.

2.08. PRESSURE GAUGES

- A. Gauges shall be 2-inch dial, simple or compound type, with 1/4-inch NPT bottom connections. Pressure ranges shall be selected for proper sensitivity and so that the dial indicator points to the approximate center of the dial in normal operation. A brass tee handle air relief cock shall be installed before each gauge. Gauges shall conform to the requirements of ANSI B40.1 for Grade AA gauges. Pressure gauges shall be easily readable from the floor, where shown on the Contract Drawings, and shall be manufactured by H.O. Trerice Company, Ashcroft, or equal.

PART 3 EXECUTION

3.01. INSTALLATION

- A. General - Run all piping true, parallel and plumb to walls. Run exposed piping as high as possible unless otherwise noted. Do not run within 6 inches of finished floors across

windows, doors, or in such a way as to interfere with access to or operation of equipment, or with less than head clearance without approval. All piping in finished rooms shall be concealed unless otherwise noted. If furred, install to require minimum furring. No piping shall touch any other system except at final connection.

Ream, file, and remove all burrs. Make all offsets and joints with fittings. Hand bent and sprung pipe not permitted. Machine bent pipe permitted with specific approval of the Engineer, if it does not restrict cross sectional area. Do not use reducing bushings, close nipples, or concealed unions without permission of Owner.

Refit or replace pipe, seals, or equipment where leaks occur. Sealing compounds not permitted. Use insulated connections for all joints of dissimilar metals.

B. Pipe Joints

1. Flanged Joints - Shall be brought to exact alignment and all gaskets and bolts or studs inserted in their proper places. Bolts or studs shall be uniformly tightened around the joints. Where stud bolts are used, the bolts shall be uniformly centered in the connections and equal pressure applied to each nut on the stud. Pipes in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot. Gaskets shall be ring type, 1/16-inch thick, cloth inserted rubber gaskets. Bolts must be of the size called for and in accordance with the American Standard with square or hexagonal nuts. For sizes and lengths the "Cast Iron Handbook" should be consulted.
2. Screwed Joints - All screwed joints shall have long tapered threads to be made with the appropriate paste of jointing compound, depending on the type of liquid to be processed through the pipe. All pipe up to, and including 1-1/2 inches, shall be reamed to remove burr and stood on end and well pounded to remove scale and dirt. Pipe in all lines subject to temperature changes shall be cut short and cold sprung into place to compensate for expansion when hot. Joints in plastic piping shall be made with compounds recommended by the manufacturer.
3. Soldered Joints - Shall have the burrs removed and both the outside of the pipe and the inside of fittings shall be thoroughly cleaned by proper tools recommended for that purpose. 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. Joints shall be heated and solder applied until it shows uniformity around the end of joints between fitting and pipe. Use 95/5 tin/antimony solder. All joints shall be allowed to self cool to prevent the chilling of solder. Wipe all joints after cooling to remove flux residue. Combination flux and solder paste manufactured by a reputable manufacturer is acceptable.
4. Solvent or Adhesive Welded Joints - 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. Care shall be taken that no droppings or deposits of adhesive or solvent material remain inside the assembled piping. Solvent or adhesive material shall be compatible with the pipe itself, being a product approved by the pipe manufacturer. Solvent cement for CPVC piping shall conform to ASTM D2564.

- C. Valves - Intent of this specification in general is that section valves shall be installed to isolate all branch lines to grouped fixtures and to otherwise make possible the isolation of each individual fixture or piece of equipment not otherwise provided with stops.

- D. Piping Support - All pipe supports and hangers shall be provided in accordance with Section 15140, Supports and Anchors.

3.02. TESTING

- A. All water pipelines shall be tested hydrostatically for 15 minutes at a pressure 50 percent in excess of the pressures to which the pipe will normally be subjected, but in no case less than 100 pounds per square inch (psi). Test duration shall be long enough to determine if there are any leaks but not less than 1/2 hour for each 500 cubic feet of pipe volume or fraction thereof. Any obvious leaks or ruptured piping disclosed by the tests shall be repaired or replaced, and the test repeated to the Engineer's satisfaction.
- B. The Contractor shall accomplish the required tests on the pipeline by individually testing each component section of line designated by the Engineer. All water for tests shall be furnished and disposed of by the Contractor at his expense. Source and/or quality of water which the Contractor proposes to use in testing the lines shall be acceptable to the Engineer.

3.03. CLEANING WATER SYSTEMS

- A. Thoroughly flush out all piping in the system. Clean all gauge glasses, strainers, valve seats, etc.
- B. All pipe and fittings connected to and forming a part of the potable water system shall be sterilized in a manner acceptable to the Engineer. Sterilization shall be accomplished after the pipe has passed the hydrostatic tests. The method proposed by the Contractor shall be in full accordance with the requirements of the State (or County) Department of Health or AWWA C601 68 and shall be acceptable to the Engineer.

END OF SECTION

SECTION 15430

PLUMBING-DRAINAGE AND VENT PIPING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. The Contractor shall furnish all labor, materials, equipment, tools and services to install plumbing systems as specified herein and as shown on the Drawings. All materials shall be new. All work shall be subject to applicable sections of these specifications.

1.02. RELATED SECTIONS

The specification sections listed below are an integral part of this equipment specification, and the Contractor shall be responsible for providing these sections to the equipment suppliers:

- A. Section 01300 - SUBMITTALS
- B. Section 01640 - EQUIPMENT GENERAL
- C. Section 09900 PAINTING
- D. Section 15140 - SUPPORTS AND ANCHORS
- E. Section 15260 - PIPING INSULATION
- F. Section 15400 - PLUMBING-GENERAL

1.03. SUBMITTALS

- A. Shop Drawings - Provide shop drawings in accordance with Section 01300 for the following equipment:
 - 1. Vent caps.
 - 2. Floor drains.
 - 3. Piping materials.
 - 4. Cleanouts.
 - 5. Supports and anchors.
 - 6. Traps.

PART 2 PRODUCTS

2.01. PIPING MATERIAL

- A. Cast Iron Soil Pipe and Fittings - Shall conform to the standards of the Cast Iron Soil Pipe Institute (CISPI) Specification HS-82, ASTM A74, and ANSI A112.5.1 for hub and spigot pipe

or CISPI 301 and ASTM A888 for no-hub pipe. Pipe class shall be as stated in the piping schedule.

- B. Type DWV Copper Piping - Shall conform to ASTM B306-88. Soldered fittings shall be of cast red brass conforming to ASTM D145 or wrought copper conforming to ANSI B16.22.
- C. Polyvinyl Chloride (PVC) Piping and Fittings - Shall be manufactured in accordance with ASTM D1784, Schedule 40. Fittings used with this pipe shall be the solvent weld type conforming to ASTM D2665, as noted on the pipe schedule or as otherwise shown on the Contract Drawings. All piping and fittings shall be of the same color and provided by the same manufacturer.

2.02. CLEANOUTS

- A. Cleanouts shall be installed where indicated on the Contract Drawings, at the base of all stacks, on all traps, at all points where the direction of flow changes and where the distance from the previous cleanout exceeds 50 feet. The interior of each system must be accessible throughout.
- B. Cleanouts shall be as manufactured by Jay R. Smith, Josam Manufacturing Company, or equal.
- C. All cleanout plugs in screwed facilities shall be solid cast brass of the screwed type. Cleanout plugs shall be the full size of the pipe up to 4 inches and shall be 4 inches for larger pipes. Cleanout plugs shall be Jay R. Smith, Josam Manufacturing Company, or equal.
- D. All cleanouts in finished floors shall be constructed of galvanized cast iron body, round adjustable top with inside caulk outlet, round top, heavy duty screwed-down bronze cover, bronze "T" handle closure plug, and shall be Jay R. Smith, Josam Manufacturing Company, or equal.
- E. All PVC cleanouts shall be as manufactured by Plastic Oddities, Inc.; Zurn; or equal. Provide PVC cleanouts and heavy duty access cover at locations as shown on the Contract Drawings.

2.03. FLOOR DRAINS

- A. Provide as indicated on Drawings. Size: same as piping connection to drain.
 - 1. Josam Series 32300, Jay R. Smith 2131 Series, Zurn Z-541, or equal coated cast iron floor drain with double drainage flange, weepholes, bottom outlet, round top, heavy duty loose set anti-tilting super-flo grate with perimeter drainage slots. Provide flashing clamp device as required.

2.04. TRAPS

- A. Every fixture and drain shall be separately trapped, unless otherwise indicated on the Contract Drawings. All traps shall be of the water sealing type, placed as close to the fixture or drain outlet as possible. All traps shall correspond as to quality, material and thickness with the other fittings in the lines in which they are installed and shall be of approved type.

2.05. FLOOR DRAIN TRAP SEALER

- A. Provide all floor drains, new and existing, with inline floor drain trap sealers. Trap sealers shall be certified to ASSE 1072; RectorSeal, model SureSeal or equal.

2.06. VENT CAPS

- A. Roof vents shall be provided with vent caps. Caps shall be Jay R. Smith Figure No. 1748, Josam Series 26700, Zurn Z 193, or equal as required.

PART 3 EXECUTION

3.01. INSTALLATION

- A. General
 - 1. Install all work in accordance with the approved shop drawings, the original design, and all pertinent regulations and codes, anchoring all components firmly into position for long life under hard use.
 - 2. Thoroughly clean all fixtures and remove manufacturer's label and ink marks; check installation of toilet seats, china caps, and cap nuts.
 - 3. All soil, waste, floor drain, and vent piping shall be installed as shown on the Contract Drawings for all fixtures and equipment.
 - 4. Horizontal soil and waste drainage piping 3 inches diameter and smaller shall be installed with a minimum pitch of 1/4-inch per foot. Horizontal soil and waste drainage piping 4 inches diameter and larger shall be installed with a minimum pitch of 1/8-inch per foot. Offsets in piping shall be made at an angle of 45 degrees or less. Horizontal vent piping shall be graded to prevent an accumulation of water.
 - 5. Reducing fittings shall be used for all changes in pipe size. Bushings will not be permitted. Floor drainage piping shall be pitched as required or as shown to give complete drainage.
- B. Installation of Piping - Soil and waste piping system shall be provided and installed in accordance with the specifications and Contract Drawings.
- C. Cleanouts - Screwed cleanouts shall be provided at the ends of all drainage lines, at changes of direction, and at other points necessary to make the entire drainage system accessible for rodding. Cleanouts shall be the same size as piping. Cleanouts below the floor shall be extended to the floor level and provided with deck plate lugs.
- D. Roof Vent Extensions - All vent pipes passing through roofs shall be properly flashed and made watertight. All pipes passing through roofs shall be provided with approved flashing fittings and coordinated with roof system to properly receive the flashing. Vents shall be extended above the roofs to the heights required by the applicable Building Codes, and the tops of all vent pipes shall be provided with approved vent caps.
- E. Hub and Spigot Joints - Compression gaskets for hub and spigot joints shall be neoprene type acceptable for below-grade installation. Install per manufacturer's recommendations.
- F. No-Hub Joints - Fittings and all parts of the clamp assembly used in jointing "hubless cast iron sanitary systems" for soil, waste, vent and house of 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 310-69T and ASTM C564.

- G. Soldered Joints - Shall have the burrs removed and both the outside of pipe and the inside of the fittings shall be thoroughly cleaned by proper tools recommended for that purpose. Flux shall be applied to both pipe and inside of fittings and the pipe placed into fittings and rotated to ensure equal distribution of flux. Joints shall be heated and solder applied until it shows uniformity around the end of joints between fitting and pipe. Use 95/5 tin/antimony solder. All joints shall be allowed to self cool to prevent the chilling of solder. Wipe all joints after cooling to remove flux residue. Combination flux and solder paste manufactured by a reputable manufacturer is acceptable.
- H. All PVC piping shall be installed in full accordance with the manufacturer's recommendation for the specific installation. No field bending or distortion of the pipe will be permitted. Care shall be used in installing all PVC piping systems such that these systems present a neat and clean appearance. Should poor workmanship require the replacement of any PVC piping, the cost of the replacement will be borne by the Contractor.
- I. Piping Support - All piping shall be supported in accordance with Section 15140.

3.02. PIPING SCHEDULE

- A. Provide piping in accordance with the following schedule or as otherwise noted on the Drawings:

APPLICATION	SIZES	PIPE	JOINT
Sanitary waste, vent, and floor drainage below and cast in concrete floors	All	Service weight cast iron and Schedule 40* PVC	Hub and spigot with gaskets and solvent
Sanitary waste, vent, and floor drainage above grade	All	No-hub cast iron or DWV copper and Schedule 40* PVC	No-hub or soldered and solvent

*Provide cast iron or DWV copper unless shown otherwise on Contract Drawings.

3.03. SLEEVES AND FLASHING

- A. All piping passing through walls and ceilings shall be installed in sleeves accurately located before concrete is poured, or placed in position during construction of masonry walls. Sleeves shall be sized in accordance with manufacturer's recommendations. Pipe sleeves, except for those passing through structural members, shall be 12 gauge galvanized iron. Pipe sleeves passing through structural members shall be Schedule 40 steel. Sleeves passing through floors shall extend from the bottom of the floor to a point 3 inches above the finished floor, unless shown otherwise. All steel wall and floor sleeves shall receive a commercial sandblast cleaning and only surfaces not in contact with concrete shall be painted, in accordance with Section 09900, Painting.
- B. Watertight sleeves shall be furnished for all pipes passing through floors or walls which are continually wet, under hydrostatic pressure, or below grade.
- C. Sleeves shall be in accordance with details shown on the General Drawings. If not shown on the Drawings, the Contractor shall submit to the Owner the details of the sleeves he proposes to install, and no fabrication or installation thereof shall take place until the Owner's approval is obtained. The Contractor shall coordinate location and setting of sleeve with other trades.
- D. 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-type seal consisting of interlocking synthetic rubber links connected by stainless steel bolts and

nuts with pressure plates under each end. Tightening the bolts shall compress the neoprene lines causing them to expand and form a continuous, air tight, watertight seal between pipe and sleeve. The seal shall be "Link Seal," as manufactured by the Thunderline Corporation, Wayne, MI; Innerlynx; or equal. Seal type, size, and installation thereof shall be in strict accordance with the manufacturer's recommendations. In general, sleeves installed in walls or floors against one side of which will develop a hydrostatic or gas pressure, or through which leakage of liquid will occur, shall be so sealed. Seals shall be provided for all piping passing through walls between explosionproof and non explosionproof areas. Refer to standard details as shown on the Contract Drawings for wall, floor, and deck sleeve details.

- E. Flashing and flashing sleeves shall be furnished for all piping passing through the roof. Flashing shall extend into the roof on all sides of sleeve. Flashing sleeves shall be coordinated with the roof system.
- F. Sleeves through fire/smoke walls and floors shall be installed per NFPA and seal all cracks and voids with fireproof sealant.

3.04. TESTING

- A. Perform all tests in the presence of the Owner's representative. Plug all openings and fill the system to 10 feet head of water. The system shall remain drip tight for three hours. Any obvious leaks disclosed by the test shall be repaired and the test repeated to the satisfaction of the Owner. Test all drainage pipe before concealing. Where testing sections separately, use hydrostatic pressure equivalent to 10 feet head of water. Make all other such tests such as air, smoke, or peppermint tests where required by the local inspector or code.

3.05. CLEANING DRAINAGE PIPING SYSTEMS

- 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. If, after this cleaning any obstructions remain, they shall be corrected to the satisfaction of the Engineer.

END OF SECTION

SECTION 15440
PLUMBING-FIXTURES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. The Contractor shall furnish all labor, materials, equipment, tools and services to install plumbing equipment specified herein. All materials shall be new. All work shall be subject to applicable sections of these specifications. Provide all fixtures and equipment as shown on the Drawings.

1.02. RELATED SECTIONS

The specification sections listed below are an integral part of this equipment specification, and the Contractor shall be responsible for providing these sections to the equipment suppliers:

- A. Section 01300 - SUBMITTALS
- B. Section 01640 - EQUIPMENT-GENERAL
- C. Section 09900 - PAINTING
- D. Section 15100 - INSIDE PROCESS VALVES AND HYDRANTS
- E. Section 15140 - SUPPORTS AND ANCHORS
- F. Section 15250 – PIPING INSULATION
- G. Section 15400 - PLUMBING-GENERAL

1.03. SUBMITTALS

- A. Shop Drawings - Provide shop drawings in accordance with Section 01300, Submittals, for the following equipment:
 - 1. Utility sinks.
 - 2. Water heater.
 - 3. Safety eyewash and showers.
 - 4. Tempering valve.
 - 5. Potable water thermal expansion tank.

PART 2 PRODUCTS

2.01. GENERAL

- A. All trim including, but not limited to, bolt heads, stops, and exposed supplies and fixture wastes shall be chrome plated unless otherwise noted. Provide chrome-plated brass escutcheon plates with set screws for all pipes passing through walls and floors. All supplies shall have stops whether included in the plate number or not, unless otherwise noted.

2.02. PLUMBING FIXTURES

- A. Wall Sink – Provide 25-inch x 20-inch wall-mounted stainless steel wall trough sink as shown on the Contract Drawings. Sink shall be 14 gauge (2.0mm), Type 304 stainless steel.
 - 1. Frankie WTS2025 or equal.
 - 2. Exposed surfaces shall have satin finished, 6-inch backsplash, radius coved bowl corners, and rolled radius rim. 3-1/2-inch strainer and 1-1/2-inch waste centered in bowl.
 - 3. Faucet - Service sink faucet with 3/4-inch hose thread outlet, bucket hook, top spout brace, cast brass "H" and "C" indexed level handles, 1/2-inch female adjustable inlet "C" union couplings, rough chrome finish and vacuum breaker as manufactured by Chicago No. 897, or equal. Surface mount fixture from wall above sink.

PART 3 EXECUTION

3.01. INSTALLATION

- A. All equipment shall be installed securely in an approved, workmanlike manner. All wall mounted fixtures shall be supported from concealed hangers or carriers.
- B. All fixtures shall be free from imperfections, true as to line, angles, curves and color, smooth, watertight, complete in every respect.
- C. It shall be the responsibility of this Contractor to guarantee proper selection and coordination of all fittings and parts relating to each fixture.
- D. Water supplies to all fixtures shall be valved at fixture.
- E. All fixtures shall be left thoroughly clean and free from all marks and foreign substances.
- F. The Contractor shall replace all leaky faucets and valves prior to final inspection.
- G. All faucets shall have visible indices. All trim shall be permanently stamped with manufacturer's identification visible after installation.

END OF SECTION

SECTION 15835

TERMINAL HEAT TRANSFER UNITS

PART 1 GENERAL

1.01. SCOPE OF WORK

- A. Separated combustion gas-fired unit heaters.

1.02. PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 15985 - HVAC Controls and Sequence of Operation: Installation of room thermostats.

1.03. RELATED SECTIONS

- A. Section 15170 - MOTORS
- B. Section 15985 - HVAC CONTROLS AND SEQUENCE OF OPERATION
- C. Division 16 - ELECTRICAL

1.04. REFERENCES

- A. AGA - American Gas Association
- B. ANSI/NFPA 70 - National Electrical Code (NEC)
- C. NFPA 54/ANSI Z223.1 - National Fuel Gas Code
- D. 2010 Fuel Gas Code of NYS - Fuel Gas Code of New York State

1.05. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300, Submittals.
- B. Submit shop drawings indicating cross section of cabinets, grille, bracing and reinforcing, and typical elevation.
- C. Submit product data under provisions of Section 01300, Submittals.
- D. Submit product data including catalog information showing equipment arrangements and accessories as well as any NEC equipment ratings.
- E. Indicate mechanical and electrical service locations and requirements, specifically indicating deviations from indicated products.
- F. Submit manufacturer's installation instructions under provisions of Section 01640, Equipment-General.

1.06. PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01700, Record Documents.

1.07. OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700, Record Documents.
- B. Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.08. DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 01600, Material and Equipment.
- B. Store and protect products under provisions of Section 01600, Material and Equipment.
- C. Protect units from physical damage by storing in protected areas and leaving factory covers in place.

1.09. SEQUENCING AND SCHEDULING

- A. Sequence work under the provisions of Section 01010, Summary of Work.
- B. Schedule work under the provisions of Section 01010, Summary of Work.

1.10. WARRANTY

- A. Provide two-year manufacturer's warranty under provisions of the General Conditions, Supplementary Conditions, and Section 01640, Equipment-General.
- B. Warranty - Include coverage of unit heater motors.

PART 2 PRODUCTS

2.01. SEPARATED COMBUSTION GAS-FIRED UNIT HEATERS

- A. Manufacturers
 - 1. Reznor - Model UDAS
 - 2. Modine - Model Hot Dawg HDS
 - 3. Or approved equal
- B. Unit heater shall be separated combustion type, suitable for firing with natural gas and shall have AGA certification. Controls shall be on/off with electronic spark ignition, intermittent duty pilot systems.
- C. Unit combustion air inlet and venting shall be power type, through the wall via an engineered vent terminal assembly provided by the unit heater manufacturer. Unit vent pipe and accessories shall be Category III, galvanized steel for positive pressure venting.
- D. Unit shall be provided with Type 409 stainless steel heat exchanger and burner, fan safety guard, electronic flame supervision and timed lockout, complete low voltage temperature controls and 24 volt low voltage transformer suitable for use with remote pilot duty thermostat.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that surfaces are ready to receive work and opening dimensions are as instructed by the manufacturer.
- B. Verify that required utilities are available, in proper location, and ready for use.
- C. Beginning of installation means installer accepts existing surfaces.

3.02. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Hang unit heaters from building structure, with pipe hangers anchored to building, not from piping. Mount as high as possible to maintain greatest headroom unless otherwise indicated.
- C. Protect units with protective covers during balance of construction.

3.03. CLEANING

- A. Clean work under provisions of 01010, Summary of Work.
- B. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
- C. Touch up marred or scratched surfaces of factory finished cabinets, using finish materials furnished by manufacturer.

END OF SECTION

SECTION 15870
POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Centrifugal sidewall exhaust fans.

1.02 RELATED SECTIONS

- A. Section 15170 – MOTORS
- B. Section 15990 – TESTING, ADJUSTING AND BALANCING

1.03 REFERENCES

AMCA 99	Standards Handbook
AMCA 210	Laboratory Methods of Testing Fans for Rating Purposes
AMCA 261	Directory of Products Licensed to Bear the AMCA Certified Ratings Seal
AMCA 300	Test Code for Sound Rating Air Moving Devices
AMCA 301	Method of Publishing Sound Ratings for Air Moving Devices
NEMA MG1	Motors and Generators
NFPA 70	National Electrical Code
UL 705	Power Ventilators

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300, Submittals.
- B. Product Data - Provide data on fans and accessories including fan curves with specified operating point clearly plotted, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

- A. All fans shall be tested and licensed to bear the AMCA sound and air performance seals.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01640, Equipment-General.
- B. Maintenance Data - Include instructions for lubrication, motor and drive replacement, spare parts list and wiring diagram.

PART 2 PRODUCTS

2.01 CENTRIFUGAL SIDEWALL EXHAUST FAN

- A. Manufacturers
 - 1. Greenheck - Model CW.
 - 2. Loren Cook - Model ACW.
 - 3. Or equal.
- B. Product Requirements
 - 1. Performance Ratings - Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
 - 2. Sound Ratings - AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
 - 3. Fabrication - Conform to AMCA 99.
 - 4. UL Compliance - UL listed and labeled, designed, manufactured and tested in accordance with UL 705.
- C. Performance – 300 CFM at 0.25-inch w.c. external static pressure.
- D. Fan Unit - Direct driven with spun aluminum housing; resiliently mounted motor; 1/2-inch mesh, 16 gage aluminum bird screen.
- E. Wheel
 - 1. Non-overloading, backward inclined centrifugal aluminum wheel.
 - 2. Statically and dynamically balanced in accordance to AMCA Standard 204-05
- F. Electrical Characteristics and Components
 - 1. Electrical Characteristics – 120v, 1 phase.
 - 2. Electrical Components - In accordance with Division 16.
 - 3. Wiring Terminations - Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
 - 4. Disconnect Switch - Factory wired, manual motor starting switch, in housing for thermal overload protected motor.
- G. Motor
 - 1. Motor to be a DC electronic commutation type motor specifically designed for fan applications. AC induction type motors are not acceptable. Provide with motor-mounted speed dial for fan balancing.

2. Motor shall be electrically commutated motor capable of variable speed operation using a 0-10 VDC motor mounted speed dial.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Manufacturer shall provide services in accordance with Section 01640, Equipment-General.
- B. Balance fan using motor mounted speed dial to provide the specified ventilation rate. Do not balance using volume damper.
- C. Secure fan with stainless steel fasteners.
- D. Do not operate fans for any purpose until ductwork is clean and fan has been test run under observation. Testing shall be conducted as specified in Section 15990.

END OF SECTION

SECTION 15910
DUCTWORK ACCESSORIES

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish, install, and test ductwork accessories in accordance with the Contract Documents.
 - 1. Volume control dampers.
 - 2. Air turning devices.
 - 3. Duct access doors.
 - 4. Duct test holes.

1.02. RELATED SECTIONS

- A. Section 15290 - DUCTWORK INSULATION
- B. Section 15890 - DUCTWORK

1.03. REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
- B. SMACNA - Low Pressure Duct Construction Standards

1.04. 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.
- B. Provide product data for hardware used.

PART 2 PRODUCTS

2.01. VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.
- B. Provide dampers with same corrosion resistance as ductwork they are to be installed in. Refer to Section 15890, Ductwork, for corrosion-resistant specifications.
- C. Fabricate single blade dampers for duct sizes to 9-1/2 x 30 inches.

- D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inches. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware. Provide corrosion-resistant frame and hardware as required.
- E. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- F. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
- G. On insulated ducts, mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.02. AIR TURNING DEVICES

- A. Acceptable Manufacturers
 - 1. Ductmate.
 - 2. Anemosat.
 - 3. Semco.
 - 4. Or equal.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades.

2.03. DUCT TEST HOLES

- A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- B. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing.
- C. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside where indicated.
- D. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 12-inch x 12-inch size for hand access, 18-inch x 18-inch size for shoulder access, and as indicated.
- E. Provide duct test holes where required for testing and balancing purposes.

- F. Ductwork accessories specified herein shall be constructed of the same material as the ductwork.

END OF SECTION

SECTION 15940

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Louvers.

1.02. RELATED SECTIONS

- A. Section 07920 - CAULKING AND SEALANTS
- B. Section 09900 - PAINTING: Painting of ductwork visible behind outlets and inlets.
- C. Section 15890 - DUCTWORK
- D. Section 15910 - DUCTWORK ACCESSORIES
- E. Section 15990 - TESTING, ADJUSTING AND BALANCING

1.03. REFERENCES

ADC 1062	Certification, Rating and Test Manual
AMCA 500	Test Method for Louvers, Dampers and Shutters
ANSI/NFPA 90A	Installation of Air Conditioning and Ventilating Systems
ARI 650	Air Outlets and Inlets
ASHRAE 70	Method of Testing for Rating the Air Flow Performance of Outlets and Inlets
SMACNA	Low Pressure Duct Construction Standard

1.04. QUALITY ASSURANCE

- A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate performance of louvers in accordance with AMCA 500.

1.05. REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 90A.

1.06. SUBMITTALS

- A. Submit product data under provisions of Section 01640, Equipment-General.
- B. Provide product data for items required for this project.
- C. Submit schedule of outlets and inlets indicating type, size, location, application, free area, and noise level.

- D. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.
- E. Submit manufacturer's installation instructions under provisions of Section 01640, Equipment-General, for louvers and diffusers.
- F. Submit manufacturer's color chart for color selection by Owner.

PART 2 PRODUCTS

2.01. FIXED LOUVERS

- A. Manufacturers
 - 1. Greenheck - Model ESJ-401.
 - 2. Arrow - Model EA-415-D.
 - 3. Or equal.
- B. Fabricate of 12 gage (0.081-inch) extruded aluminum channel frame, 12 gage (0.081-inch) thick blades positioned at 45-degree angles, welded assembly, with factory Kynar or equal 70 percent fluoropolymer factory finish. A custom color shall be provided as selected by the Engineer.
- C. Louver shall bear the AMCA seal for air performance and water penetration.
- D. Provide exterior-mounted aluminum bird screen with 1/2-inch square mesh for exhaust and 3/4-inch for intake. Finish is to match louver.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install items in accordance with manufacturers' instructions.
- B. Provide balancing dampers where shown on Contract Drawings and as required for system air balancing.

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. Electrical supports, anchors, and fasteners.
- H. Nameplates and labels.
- I. Equipment testing.

1.02. RELATED SECTIONS

- A. Section 01010 - SUMMARY OF WORK
- B. Section 01019 - CONTRACT CONSIDERATIONS
- C. Section 01026 - LUMP SUM ITEMS
- D. Section 01039 - COORDINATION
- E. Section 01300 - SUBMITTALS
- F. Section 01400 - QUALITY CONTROL
- G. Section 01500 - TEMPORARY FACILITIES
- H. Section 01564 - EROSION CONTROL
- I. Section 01600 - MATERIAL AND EQUIPMENT
- J. Section 01640 - EQUIPMENT-GENERAL
- K. Section 01660 - TESTING AND STARTUP
- L. Section 01700 - RECORD DOCUMENTS
- M. Section 02212 - PAVEMENT CUTTING

- N. Section 02205 - PROTECTION OF EXISTING FACILITIES
- O. Section 02222 - EXCAVATING
- P. Section 02223 - BACKFILLING
- Q. Section 02228 – COMPACTION
- R. Section 03001 – CONCRETE
- S. Section 09900 - PAINTING
- T. Section 16161 - CONTROL PANELS AND ENCLOSURES

1.03. 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.

1.04. 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, and instrumentation systems, including exposed raceway systems, conductors, cables, fittings, wiring devices, distribution equipment, starters, 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 an 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 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 wiring systems.

1.05. 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 Underwriters Laboratories, 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 in the drawings submitted or in the satisfactory operation of any equipment.

1.06. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300.
- B. 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 enclosures, lighting fixtures, starters, overcurrent devices, panelboards, control and starter panels, and all other electrical equipment as listed in other Sections.

1.07. RECORD DRAWINGS

- A. In addition to the requirements of Section 01700 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. See sample attached to end of this Section.
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: _____."

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 20____, as a minimum. Later revisions shall be saved as this version.

1.08. 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. 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.
- C. Damaged equipment, as determined by the Owner and/or the Engineer, shall either be repaired to new condition or replaced with new equipment.

- D. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or similar protective cover.

1.09. EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. The locations of equipment, fixtures, outlets and similar devices shown on the Contract Drawings are approximate only.

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.
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 pounds 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 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)
 - a. Application - Except as otherwise indicated on the Contract Drawings or in other paragraphs of this section, all wiring shall be run in Type D conduit.
 - b. Description - Rigid, non-metallic conduit, shall be rigid PVC, 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
2. Type E – PVC-Coated Rigid Steel Conduit With an Interior Urethane Coating
 - a. Application - For signal or instrumentation conduit systems.
 - 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. 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 polyvinyl chloride jacket.
 - c. Manufacturers
 - 1) Pittsburgh Standard (RobRoy Industries).
 - 2) Anonconda
 - 3) Triangle

- 4) Keystone
- 5) O.Z. Gedney

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. Provide cover gasket in wet or corrosive locations. Provide terminal strips for joining conductors in boxes over 100 cubic inches.
- 3. Manufacturers
 - a. Fort Miller.
 - b. Kistner.
 - c. Lakelands.

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 - Thunderline Corporation, 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.

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 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.

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).

4. 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 B8 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."

5. Control Panel Wire

- a. Application - For use in all manufactured or custom built control panels and motor control centers.
- 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.

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.

2. Terminal Block Manufacture

- a. Control Wiring
 - 1) Buchanan - Model 0241.
 - 2) Connectron - Model NSS3.
- b. Equipment Power Wiring
 - 1) Buchanan - Model 416.
 - 2) Connectron - Model NC3.

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. 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.
- 5. Bus or Lug Terminals, Manufacturer - 600 VAC, Crimp Type
 - a. Burndy - "HYLUG" Catalog, Series YA.
 - b. Ideal - Catalog Series CCL and CC.
- 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.
- 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.
 - 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.
- 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.

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

B. Receptacles (Note: All receptacles shall be "side wired" style. "Push-in" styles are not acceptable.)

1. Single Convenience Receptacle

- Pass & Seymour, Inc. - Model 5361.
- Hubbell - Model 5361.
- General Electric - Model 4102.
- Leviton - Model 5361.

2. Duplex Convenience Receptacle (Interior Use Only) - 20 amp, 125 volt.

- Pass & Seymour, Inc. - Model 5362.
- Hubbell - Model 5362.
- General Electric Co. - Model GE5342.
- Leviton - Model 5362.

3. GFCI Receptacle

- Pass & Seymour, Inc. - Model 2091-S.
- Hubbell - Model GF-5362.
- General Electric - Model GFR-5342.
- Leviton - Model 6899.

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
 - 1) Surface-Mounted Raceway - Standard brown non-metallic receptacle plates. Standard brown non-metallic switchplates.
2. Interior, Wet Areas - Non-metallic weatherproof receptacle plate.

2.04. PANELBOARDS

A. General

1. Interiors
 - a. All interiors shall be completely factory assembled.
 - b. Panelboards shall be double row construction.
 - c. Neutral bars to be full size and insulated. Neutral bussing to have suitable lugs for each feeder.
 - d. Provide a ground bus in each panel.
2. Boxes, Panelboard - Provide at least minimum gutter space in accordance with the NEC.
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.

B. Lighting Panelboards (LP)

1. Definition - Lighting panelboards shall operate at 208Y/120 volt, 3 phase power. 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 (handle ties not allowed). Contacts shall be silver alloy.
3. Main circuit breakers shall be rated 22,000 A.I.C.

4. Panelboards for use at 240 volts AC maximum shall incorporate branch circuit breakers as shown or scheduled rated at 22k A.I.C. symmetrical at 240 volts.
5. Provide three handle padlock attachments for each one-pole, two-pole, and three-pole breakers.
6. Design Basis - Square D Model NQOD.

2.05. ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS

A. General

1. Materials and Finishes - Provide products which incorporate corrosion resistance adequate for the conditions in which they are to be installed.
2. The following materials are not acceptable: spring steel clips, spring steel clamps, powder-actuated anchors, and expansion anchors of any kind.

B. Electrical Channel

1. For Non-classified Areas - Hot dipped galvanized channel. Manufacturers: Kindorf, Uni-Strut, B-line, Globe. Non-metallic (fiberglass). Manufacturers: Robroy Industries, Enduro, Aickinstrut, Strut Tech.
2. For Wet Areas - Non-metallic (fiberglass). Manufacturers: Robroy Industries, Enduro, Aickinstrut, Strut Tech.
3. For Corrosive Areas –Non-metallic (fiberglass). Manufacturers: Robroy Industries, Enduro, Aickinstrut, Strut Tech.

C. Conduit Clamps

1. Two or more conduits run parallel for a distance of more than 5 feet shall be supported from electrical channel by steel conduit straps. Straps shall be PVC coated in all classified and exterior applications.
2. All conduits that do not meet the above criteria shall be supported using cast malleable iron clamp and mating malleable iron clamp backer-spacer (two-piece clamp). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Clamp and spacer shall be PVC coated for all classified and exterior applications. Stamped metal or two-piece PVC clamps are not acceptable.

2.06. 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 shall have each end of the conductor labeled. Label wires at each junction box.

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.
2. No conduits within walls where the walls are below grade, i.e., in basements or galleries.
3. 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.
4. Conduit Cutting - Cut all conduit ends square and remove all burrs. Cut conduit ends exactly to avoid excessive penetration into boxes.
5. 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 Type D conduit or 100 feet or

more for Type E, or wherever shown or specified. Support conduit on each side of the expansion joint.

6. 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.
7. 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.
8. 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.
9. 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.
10. Conduit Bends and Elbows
 - a. Rigid Metallic Conduit Systems (Type E)
 - 1) Heating metal conduit to facilitate bending is strictly prohibited.
 - 2) Field bending metal conduit is permitted as follows:
 - a) Type E - Up to and including 3/4-inch size.
 - 3) For all rigid metal conduit larger than that above, use manufactured elbows.
 - b. Rigid Non-Metallic Systems (Type D)
 - 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 Type D 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.
11. 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.

12. 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)
- 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 sleeves 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. 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.
- F. 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. 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.
9. 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. _____-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. ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS

A. General

1. Do not drill or cut structural members.
2. Obtain the Engineer's written approval of any drilling or cutting on the structure.
3. Welding as a means of support is prohibited.
4. 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.

B. Support of Boxes, Control Panels, Starters, Disconnects, and Other Similar Enclosures

1. Support boxes independent of raceway using fittings designed for the application.
2. The use of tie wires, section of conduit, section of pipe, scrap metal, etc., as supporting means is strictly prohibited.
3. Enclosures not called to be mounted on plywood or aluminum panels or stands to be supported by 1/2-inch galvanized electrical channel.

C. Support of Raceways

1. General - Perform a thorough review of all shop drawings related to work. Determine how equipment, raceway, etc., are to be supported, mounted, or suspended, while providing:
 - a. Extra bolts, inserts, pipe stands, brackets, or any other items required for proper support.
 - b. Supporting accessories where required, whether or not shown on the Drawings.
2. Support all raceways only with approved fittings. Do not hang supporting devices from any but structural members without approval of the Engineer. Deflection of any conduit shall not exceed 1/100th of span. Support all riser conduit at each floor. Rows shall not be used.
 - a. Secure individual runs of conduit with one-hole, two-piece, PVC-coated malleable iron clamps. Stamped steel conduit straps or PVC clamps are not acceptable. Where a single conduit is hung from above, use galvanized hanger rods and electrical channel.
 - b. Secure multiple runs of conduit to fiberglass electrical channel with galvanized supports.
 - c. Raceway supports shall be spaced at intervals to meet NEC requirements. Provide supports at all bends and pull fittings.
3. Use stainless steel adhesive anchors on concrete or masonry walls for loads of 75 lbs. or more in accordance with Section 03001. For loads less than 75 lbs., drilled

anchors may be used. Use precast inserts on poured-in-place concrete when installed. Use lag screws or through bolts on wood.

4. Install supports in a manner that does not interfere with or weaken the bolts when attaching to structural steel.
5. Provide standoffs for all conduit; mount conduit 1/4 inch off walls.
6. The use of wire is prohibited, except when conduit is installed in concrete structures and then just to secure conduit to rebar.
7. Provide rods, channels, angles or other structural shape to suspend conduit away from building structures.

3.07. EQUIPMENT TESTING (600 VOLTS AND BELOW)

A. Megohmmeter Tests

1. Conduct megohmmeter tests of the insulation resistance of all feeders. The results will be accepted when the megger shows the insulation resistance to be not less than one megohm per 100 volts at 20 degrees C using a 500 volt megger. Time of test to be 1 minute each between all conductors in same enclosure and each conductor and ground.
2. Conduct megohmmeter testing (Insulation Resistance Test) after the cables are in place and just prior to final terminations. Record all data and submit to the Engineer. See Exhibit A at the end of this section.

B. Operational - Perform operational test to determine that all components including 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. Provide a tabulation of all breaker trip settings.

C. Final Operational Check - Provide 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. If final corrections or adjustments are required, conduct additional test runs to make the final corrections or adjustments of systems refining and improving performances where possible. These additional test runs shall include 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 demonstrate that controls and items requiring service or maintenance are accessible. A final test run shall be conducted with both the Owner and Engineer present to demonstrate the complete system operation and to describe to the Owner the full functionality of each system.

D. Test ground system with a ground resistivity meter. Ground is acceptable with a resistance to ground of 5 ohms or less. Test to be performed a minimum of 90 days after ground system installation. If test reading is larger than 5 ohms, add rods to the system until a read of less than 5 ohms is obtained. Provide written test data and a certification of the completed test.

E. 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.
Refinish work where damage is extensive.

3.08. 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.
 - 6. Panelboards - 66 inches to top.
 - 7. Disconnect Switches - See Section 16161.

(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	

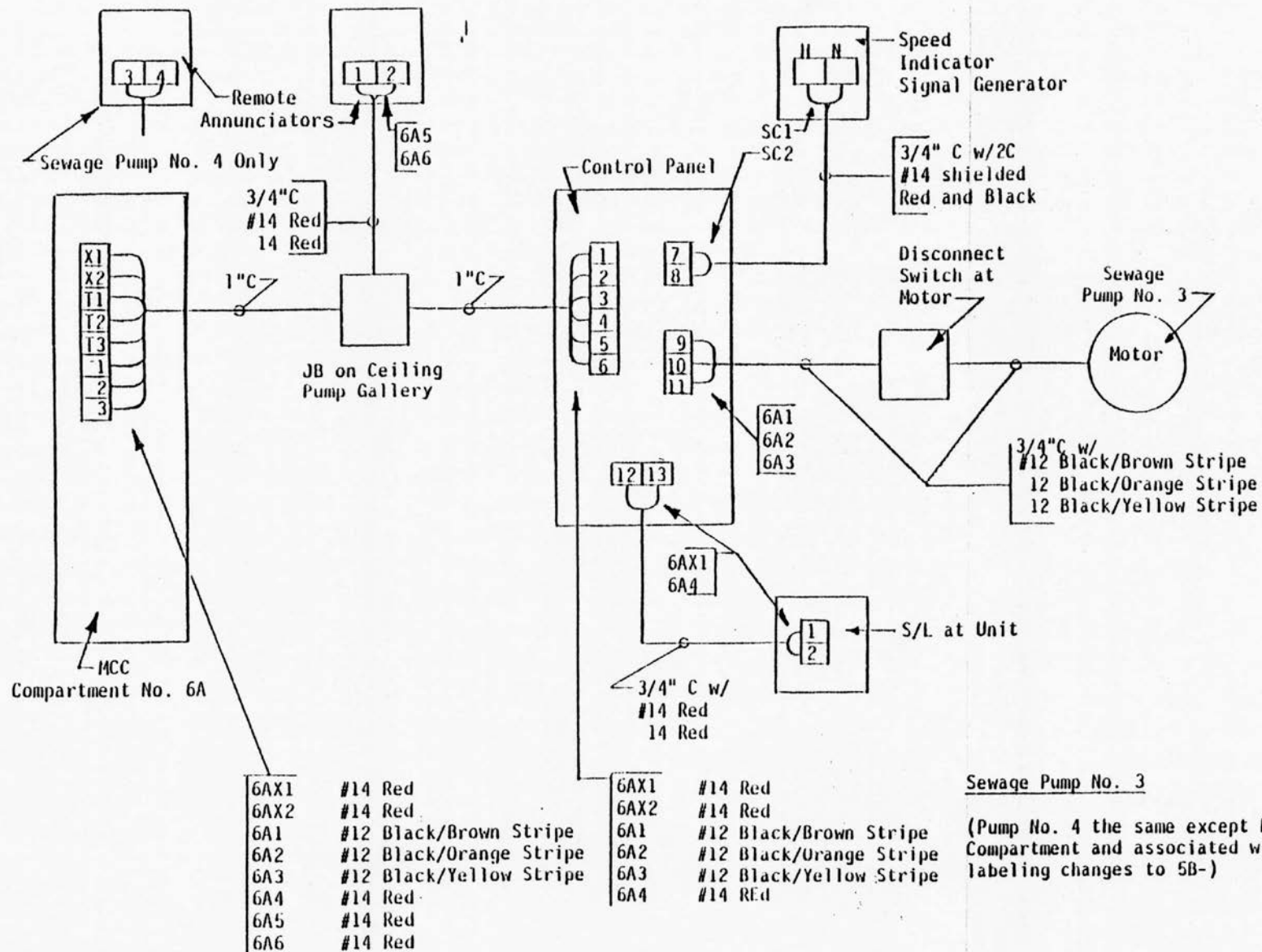
TEST EQUIPMENT CONTROL NO. _____

REMARKS: _____

PERFORMED BY: _____ DATE _____

APPROVED BY: _____ DATE: _____

Test Engineer



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. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01700 - RECORD DOCUMENTS
- C. Section 16055 - ELECTRICAL WORK

1.03. REFERENCES

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- B. NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems
- C. ANSI/NFPA 70 - National Electrical Code
- D. UL - Underwriters Laboratories, Inc.

1.04. SUBMITTALS

- A. Submit under provisions of Sections 01300 and 16055.
- 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.

1.05. 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.

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.07. EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.
- 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 4X NON-METALLIC

- A. Carlon - Model "Himeline" Series HL

- B. Substitutions - Under provisions of Section 01600.

2.02. MANUFACTURERS - NEMA 12 SINGLE DOOR

- A. Hoffman - Model Series LP
- B. Substitutions - Under provisions of Section 01600.

2.03. MANUFACTURERS - NEMA 12, TWO-DOOR AND FREE STANDING

- A. Hoffman - Model Series ULP and FS
- B. Substitutions - Under provisions of Section 01600.

2.04. 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. Door Latches - Quick release 1/4 turn operation.
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.

2.05. ACCESSORIES

- A. Manufacturer - Cable Ties
 - 1. Thomas & Betts - Model Nylon TY-WRAPs.
 - 2. Substitutions - Under provisions of Section 01600.
- B. Manufacturer - Terminal Blocks
 - 1. Buchanan - Model 0241.
 - 2. Connectron - Model N553.
 - 3. Substitutions - Under provisions of Section 01600.
- C. Manufacturer - Wire Duct
 - 1. Stahlin Brothers - Model XT-Panel Channel.
 - 2. Panduit Corporation - Model Type E-Dark Grey.
 - 3. Substitutions - Under provisions of Section 01600.
- D. Manufacturer - Grounding Terminals
 - 1. Burndy - Model OA4C-AB.
 - 2. Substitutions - Under provisions of Section 01600.
- 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.

PART 3 EXECUTION

3.01. 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.

3.02. EQUIPMENT HOUSING TYPES

- A. Enclosure, Control Panel or Device Applications – When no type is shown or specified, provide stainless steel.
 - 1. Interior Wet Locations - NEMA 4 non-metallic.
 - 2. Corrosive Areas - NEMA 4X non-metallic.

3. All Other Areas - NEMA 12 painted.

3.03. 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.

3.04. FINISH REPAIR

- A. Repair damage to the factory finish. 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.

3.05. DOOR QUANTITY

- A. Provide two doors if panel is larger than 36 inches wide.

3.06. 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.

3.07. CONTROL PANEL WIRING

- A. Wire Type - See Section 16055.
- 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.

Color coding per Section 16055.
- 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.

3.08. 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.

3.09. 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.

3.10. CONTROL PANEL INSTALLATION

- A. Wall mount panel enclosures that are up to 48 inches in height; floor mount larger panel enclosures.
- 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.
- 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.

3.11. MOUNTING HEIGHT

- A. Mount control panels such that:
 - 1. No disconnect handle is higher than 6 feet 6 inches to the highest part of handle.
 - 2. Top of wall-mounted enclosures shall not be higher than 6 feet.
 - 3. No pilot device is higher than 5 feet 6 inches.
 - 4. No operator interface device (i.e., graphic display screen, etc.) is higher than 5 feet 0 inches to the centerline of the device.

3.12. 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. All panels and enclosures shall be installed level and plumb.

END OF SECTION

SECTION 16421
UTILITY SERVICE ENTRANCE

PART 1 GENERAL

1.01. WORK INCLUDED

- A. Increasing the electrical service entrance capacity from Con-Edison.
- B. Underground service entrance.
- C. Metering equipment.
- D. Scheduling.

1.02. RELATED SECTIONS

- A. Section 01039 - COORDINATION
- B. Section 01300 - SUBMITTALS
- C. Section 01500 - TEMPORARY FACILITIES
- D. Section 01600 - MATERIAL AND EQUIPMENT
- E. Section 02222 - EXCAVATING
- F. Section 02223 - BACKFILLING
- G. Section 16055 - ELECTRICAL WORK

1.03. REFERENCES

- A. ANSI/NFPA 70 National Electrical Code.
- B. Con-Edison - Specifications for Electrical Installations.

1.04. SYSTEM DESCRIPTION

- A. Utility Company (Power) - Con-Edison.
 - 1. System Characteristics - 208/120 volts, three phase, four-wire, 60 Hertz.
 - 2. Service Entrance - Underground.

1.05. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit a copy of the letter from the utility company indicating approval of the installation.

1.06. QUALITY ASSURANCE

- A. Perform Work in accordance with utility company written requirements.
- B. Maintain one copy of utility company and inspection agency documents on site.

1.07. 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.
- C. Conform to requirements of the utility.

1.08. UTILITY COORDINATION

- A. Coordinate with the utility and arrange for a pre-installation conference to convene one week prior to commencing work of this section, under provisions of Section 01039. Conference shall be at the site of the work and include the Owner and Engineer.
- B. Submit work request via Con-Edison's on-line system.
- C. The Contractor is responsible for completing any applications including all required application or inspection fees relative to permanent equipment, cable or devices.
- D. The Owner will be responsible for all utility company charges associated with the extension of or modifications to the utility services to or upon the site.
- E. Coordinate with the electric utility for connection of electrical service. Abide by utility requirements.
- F. Existing service is 200A. The upgrade service shall be no larger than 400A. Coordinate with Engineer for service sizing/electrical loads.

PART 2 PRODUCTS

2.01. UTILITY METERS

- A. Meters will be furnished by utility company.

2.02. UTILITY METER BOX

- A. Conform with requirements as specified in Con-Edison Specifications For Electrical Installations.

2.03. METERING TRANSFORMER CABINET

- A. General - Conform with requirements as specified in Con-Edison Specifications For Electrical Installations.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify conditions under provisions of Section 01039.
- B. Verify that service equipment is ready to be connected and energized.
- C. Provide inspection certificates.

3.02. PREPARATION

- A. Make arrangements with utility company to obtain permanent electric service to the project.
- B. Coordinate location of utility company's facilities to ensure proper access is available.

3.03. INSTALLATION

- A. Install service entrance conduits as required from utility company's terminal pole to building service entrance equipment. Utility company will connect service lateral conductors to service entrance conductors.

3.04. UTILITY METERING ACCOMMODATIONS

- A. Install all test devices furnished by the utility.
- B. Utility shall provide all utility metering instruments. Mount all meter sockets as required.
- C. Utility will provide wiring from metering transformers to metering equipment.
- D. Provide grounding, connections and miscellaneous materials required.

END OF SECTION

SECTION 16460
TRANSFORMERS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Dry-type transformers and accessories.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 16055 - ELECTRICAL WORK

1.03. REFERENCES

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. Except where a specific date is given, the issue in effect on the date of Invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.

- A. National Fire Protection Association (NFPA) No. 70.
- B. National Electrical Code (NEC).
- C. American National Standards Institute (ANSI).
- D. American Society for Testing and Materials (ASTM).
- E. National Electrical Manufacturer's Association (NEMA).
- F. Underwriter's Laboratories, Inc. (U.L.).

1.04. SUBMITTALS

- A. Submittals shall be made in accordance with Sections 01300 and 16055.
- B. Shop drawings shall be submitted on all items of equipment and accessories provided under this section.
- C. Submittals shall contain data describing the materials and showing its compliance with specification, associated standards and test requirements. Include the following as a minimum:
 - 1. Transformer floor plans, elevations, dimensions, and weights.
 - 2. Electrical performance, including voltage, taps, kVA, impedances, losses, sound ratings, temperature rise, and BIL.
 - 3. Connection diagrams.

4. Special features.
- D. Certified Test Report
1. Submit certified test report of electrically similar unit with shop drawing.
 2. Submit prior to installation of unit, certified test report of actual unit.

PART 2 MATERIALS

2.01. GENERAL

- A. Transformer kVA shall be as stated on the Contract Drawings.
- B. Transformers shall be of the two winding type.
- C. Exteriors shall painted use manufacturer's standard system. Final color shall be light gray.

2.02. GENERAL PURPOSE DRY-TYPE TRANSFORMERS

- A. General purpose dry-type transformers shall be used for lighting and power, 600 volts and below only.
- B. Voltage - Single phase transformers shall be 480 volt primary and 120/240 volt secondary. Three phase transformers shall be 480 delta primary and 208Y/120 unless otherwise noted on Contract Drawings. Transformers 15 kVA and larger shall have a minimum of four 2-1/2 percent full capacity primary taps.
- C. Insulation and Temperature Rise
 1. Transformers under 15 kVA shall have 185 degrees C insulation with 115 degrees C temperature rise.
 2. Insulation materials for transformers 15 kVA and above shall be in accordance with NEMA ST20 standards for a 220 degrees C UL component recognized insulation system.
 3. Transformers 15 kVA and above shall have insulation rated for 115 degrees C rise above 40 degrees C ambient. The transformer shall be U.L. listed for the specified temperature rise.
- D. Construction
 1. Transformer coils shall be copper and be of the continuous wound construction and shall be impregnated with nonhygroscopic, thermosetting varnish.
 2. All cores to be constructed of high grade, non aging, grain oriented silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. The core laminations shall be fully clamped together with structural steel angles. Coils form spaced to provide positive air ducts and exteriors wrapped to protect wire. Terminate coil leads with solderless-type lugs. Locate lugs on a rigid braced and insulated terminal board.

- 3. Mount the core and coil assembly on an effective vibration damping and isolating system within a sheet steel NEC gauge enclosure having fully screened and baffled ventilation openings. Enclosure size shall provide reasonable space for conduit entrance and cable termination. Compartment temperature rise shall be limited to 5 degrees C at full load and shall be suitable for 60 degrees C rated cable.
- E. Grounding - The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.
- F. Sound Levels - The transformers shall meet the following sound level requirements:
 - 1. Up to 50 kVA - 45 dB.
 - 2. 51 to 150 kVA - 50 dB.

2.03. TRANSFORMER MANUFACTURERS

- A. Transformer Manufacturers - Westinghouse, Square D, Hevi Duty, or equal.

PART 3 EXECUTION

3.01. WALL MOUNTED

- A. Install on bracket support fabricated from aluminum channel or angle framing providing rubber in shear vibration isolators between transformer base and bracket. Make connections to transformer with liquidtight flexible conduit installed slack.

3.02. FLOOR MOUNTED

- A. Install on equipment base at least 6 inches clear of walls or other obstructions. Provide rubber-in-shear vibration isolators between transformer and base. Secure transformer to base using anchor bolts. Provide rubber-in-base vibration isolators between flat washer under bolt head and transformer base. Provide a soft rubber sleeve to prevent bolt shank contacting transformer base. Make connections to transformer with liquid tight flexible conduit installed slack.

END OF SECTION

SECTION 16484

CONTACTORS AND MOTOR STARTING EQUIPMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Manual motor starters.
- B. Motor starters.
- C. Magnetic contactors.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 16055 - ELECTRICAL WORK
- C. Section 16161 - CONTROL PANELS AND ENCLOSURES

1.03. 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.

1.04. SUBMITTALS

- A. Submittals shall be made in accordance with Sections 01300 and 16055.
- 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.

1.05. QUALITY ASSURANCE

- A. Perform Work in accordance with NECA Standard of Installation.

1.06. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum three years' experience.

1.07. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. 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.
 - 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.

- 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.

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. Lockoff 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. 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.

C. Full Voltage Multi Speed Starting (FVMS)

1. Furnish with overload relay and auxiliary relay for each speed.
2. Square D Class 8810, Cutler-Hammer Type A700, General Electric Form CR 309, or equal.

2.04. 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.

PART 3 EXECUTION

3.01. GENERAL

- A. Install according to the requirements of the National Electrical Code and as shown or noted on the Contract 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.

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.

3.03. ENCLOSED STARTER MOUNTING

- A. Height - Per Section 16161.

END OF SECTION

SECTION 16497
TRANSFER SWITCHES

PART 1 GENERAL

1.01. WORK INCLUDED

- A. Automatic transfer switch.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01400 - QUALITY CONTROL
- C. Section 01600 - MATERIALS AND EQUIPMENT
- D. Section 01660 - TESTING AND STARTUP
- E. Section 01700 - RECORD DOCUMENTS
- F. Section 03001 - CONCRETE
- G. Section 16055 - ELECTRICAL WORK
- H. Section 16161 - CONTROL PANELS AND ENCLOSURES
- I. Section 16620 - PACKAGED ENGINE GENERATOR SYSTEMS

1.03. 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 1008 - Standard for Transfer Switch Equipment
- F. NFPA 110 - Emergency and Standby Power Systems

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop drawings shall be submitted for all materials furnished under this section.
- C. Furnish the shop drawing for the automatic transfer switch as part of the submittal for Section 16620.

- D. The shop drawing shall include, as a minimum, the following equipment specification information. The information shall be highlighted and prove compliance with these specifications.
 - 1. Electrical Ratings - Voltage, switch ampere rating, and short circuit ratings.
 - 2. Protective devices and ratings.
 - 3. Layout drawings.
 - 4. Performance functions.
- E. Manufacturer's Instruction - The Contractor shall furnish three copies of a composite instruction book covering this equipment. Each instruction book shall not necessarily be limited to, but shall include as a minimum, the following:
 - 1. Instructions covering overall equipment.
 - 2. Instructions covering all major and serviceable components.
 - 3. Instructions covering all accessories.
 - 4. Recommended spare parts with current prices, applicable to foregoing 1, 2, and 3.
 - 5. Complete renewal parts information.
 - 6. Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.07. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.05. OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Operation Data - Include instructions for operating equipment. Include instructions for operating equipment under emergency conditions when engine generator is running.
- C. Maintenance Data - Include routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

1.06. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this Section with minimum three years' documented experience, and with service facilities within 100 miles of project.
- B. Supplier - Authorized distributor of specified manufacturer with minimum three years' documented experience.

1.07. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

- C. American National Standards Institute (ANSI).
- D. American Society for Testing and Materials (ASTM).
- E. National Electrical Manufacturer's Association (NEMA), latest version.
 - 1. ICS 1 - General Standards for Industrial Control and Systems
 - 2. ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies
 - 3. ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems
 - 4. ICS 6 - Enclosures for Industrial Controls and Systems

1.08. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- 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.

1.09. FIELD MEASUREMENTS

- A. Verify that field measurements are as instructed by manufacturer.

1.10. MAINTENANCE SERVICE

- A. Furnish service and maintenance of transfer switch for five years from Date of Substantial Completion.

1.11. MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Section 01700.
- B. Provide two of each special tool required for maintenance.

1.12. WARRANTY

- A. Provide manufacturer's standard three-year warranty.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Transfer switches shall be manufactured by the same manufacturer of the generator unit.
- B. Onan OTPC (design basis).
- C. Caterpillar.
- D. Substitutions - Under provisions of Section 01600.

2.02. GENERAL

- A. Transfer switches shall be fully rated to protect all types of loads, inductive and resistive, from loss of continuity of power, without derating in the enclosure.
- B. It shall not be possible for load circuits to be connected to normal and alternate sources simultaneously. The switch shall have a manual neutral position for load circuit maintenance. Provide position indicator visible from the front to show the source to which the switch is connected.
- C. Double throw, mechanically and electrically interlocked.
- D. Operated by momentary energization of bi-directional linear induction motors with mechanical latching in both normal and emergency positions.
- E. Vertical pole arrangement.
- F. Main Contacts
 - 1. Long life, high pressure, silver alloy contacts resistant to burning and pitting.
 - 2. Provide separate arcing surfaces to protect the main contacts.
 - 3. Contacts shall be sized for maximum amperage rating of the standby and/or utility supply service as required.
- G. Arc Interruption
 - 1. Provide magnetic blowout coils and arc barriers on each pole.
 - 2. Provide covers to prevent interphase flashover. Covers shall be transparent for visual inspection.
- H. Connection Lugs - Provide compression type long-barrel, two hole cable lugs for each power cable, phase and neutral; size and conductor type cable as shown on the Contract Documents or required for the equipment. All terminals front connected and space shall be provided for all lugs as required.

2.03. AUTOMATIC TRANSFER SWITCH

- A. Description - NEMA ICS 2, automatic transfer switch.
- B. Configuration - Electrically operated, mechanically held transfer switch.

2.04. SERVICE CONDITIONS

- A. Service Conditions - NEMA ICS 1.
- B. Altitude - 1,000 feet (305 m).

2.05. RATINGS

- A. Voltage - 208 volts, three phase, four wire, 60 Hertz.
- B. Switched Poles - Three.

- C. Continuous Rating - 600 amperes.

2.06. PRODUCT OPTIONS AND FEATURES

- A. Solid-state undervoltage sensors to simultaneously monitor all phases of the normal power source and emergency source and arrange system for automatic starting upon failure of or a drop below the adjustable percentage of the normal source voltage. Field adjustable from 85 percent to 100 percent of normal source voltage.
- B. Provide a two-second timed start delay, field adjustable from 3 to 6 seconds. Delay time between normal source failure and engine starting. The transfer switch shall control the generator set to allow generator set to start and transfer load within 10 seconds after normal source power failure.
- C. Provide contacts for engine starting.
- D. Transfer loads from normal source power to emergency source when engine-generator reaches 90 percent of its rated voltage.
- E. Retransfer emergency loads from emergency generator to normal source (10) minutes after normal source has reached 90 percent or more of normal voltage. Provide 0 to 30-minute field adjustable timer. (Retransfer delay)
- F. Retransfer emergency loads from emergency generator to normal source instantaneously when normal source has reached 90 percent or more of normal voltage, if emergency generator has failed while supplying load.
- G. Run engine for a period of 5 minutes after retransfer of emergency loads to normal source. Engine generator will then shut down, automatically resetting and leaving all controls ready for the next emergency start condition. (overrun delay)
- H. Use time clock to automatically exercise engine at intervals recommended by manufacturer. Time clock contacts shall simulate loss of normal voltage, start engine, and shut engine down after 60 minutes of operation. A switch option shall be provided to exercise the plant with or without load.
- I. Operating voltage for transfer shall be obtained from the source to which the load is to be transferred.
- J. Provide the following: 0 to 60-second adjustable timer for programmed transition causing the switch to pause in the neutral position during transfer and retransfer for the set period.
- K. Provide voltage supervisory relays on each phase, such that transfer and engine start is affected should any one of the three phase supplies fall below 70 percent on normal voltage.
- L. Provide four (minimum) auxiliary contacts on shaft (field convertible). No common wires for contacts. Bring wires to terminal block, suitably labeled.
- M. Provide indicating lights (door mounted) for the following:
 - 1. Normal switch position (green).
 - 2. Normal source available (white).
 - 3. Emergency switch position (red).

- N. Provide any other accessories as may be required to achieve operation as described in this specification.

2.07. ENCLOSURE

- A. Enclosure - ICS 6, Type 3R.
- B. Finish - Manufacturer's standard color enamel.

PART 3 EXECUTION

3.01. GENERAL

- A. Standards and Tests - Equipment covered by these specifications shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of all applicable published ANSI, NEMA, and IEEE standards, and the requirements of the NEC.
- B. The Contractor shall submit shop and field test reports and conduct field tests.
- C. Owner Acceptance - Final acceptance by the Owner or his duly authorized representative of this equipment shall be contingent upon the equipment satisfactorily meeting these specifications and tests stipulated herein.
- D. Rigging - The Contractor shall with his own forces or shall engage a rigging subcontractor as required to unload, move, transport, set in place, erect, etc., the engine-generator set(s), in accordance with Section 16055.

3.02. PREPARATION

- A. Housekeeping pads are provided by others under the provisions of Section 03001.

3.03. INSTALLATION

- A. Install transfer switches in accordance with manufacturer's instructions.
- B. Provide engraved plastic nameplates under the provisions of Section 16055.
- C. Mounting Height - Per Section 16161.

3.04. MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 01400.
- B. Testing is included under Section 16620.
- C. The transfer switch shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer during the Owner's normal working hours, with required fuel supplied by Contractor. The Owner shall supply personnel to assist in the starting and stopping of the existing generator and loads. The Engineer and Owner shall be notified one week in advance in writing and shall witness the tests. Tests to be conducted on-site shall include, but not be limited to, a "cold start" test, a two hour full load test, and a one-step rated load pickup test in accordance with NFPA 110. Provide a resistive loadbank and make temporary connections for full load test, as required. Provide a written report of the test to the Engineer and Owner.

3.05. DEMONSTRATION

- A. Provide systems demonstration under provisions of Section 01660.
- B. Demonstrate operation of transfer switch in bypass, normal, and emergency modes.

END OF SECTION

SECTION 16620

PACKAGED ENGINE GENERATOR SYSTEMS

PART 1 GENERAL

1.01. WORK INCLUDED

- A. Packaged engine generator set.
- B. Exhaust silencer and fittings.
- C. Battery and charger.
- D. Weatherproof/sound-reducing enclosure.

1.02. RELATED SECTIONS

- A. Section 01039 - COORDINATION
- B. Section 01300 - SUBMITTALS
- C. Section 01400 - QUALITY CONTROL
- D. Section 01600 - MATERIALS AND EQUIPMENT
- E. Section 01640 - EQUIPMENT-GENERAL
- F. Section 01660 - TESTING AND STARTUP
- G. Section 01700 - RECORD DOCUMENTS
- H. Section 16055 - ELECTRICAL WORK
- I. Section 16161 - CONTROL PANELS AND ENCLOSURES
- J. Section 16497 - TRANSFER SWITCHES

1.03. REFERENCES

- A. NEMA AB1 - Molded Case Circuit Breakers
- B. NEMA MG1- Motors and Generators
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- D. NFPA 30 - Flammable and Combustible Liquids Code
- E. NFPA 70 - National Electrical Code
- F. NFPA 110 - Emergency and Standby Power Systems

1.04. SUBMITTALS

- A. Submit under provisions of Section 01300 and 16055.
- B. Furnish the shop drawing for the packaged engine generator system as part of the submittal for Section 16497.
- C. 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, electrical diagrams including schematic and interconnection diagrams. Indicate weights of all major components.
- D. Product Data - Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, control panel, battery, battery rack, battery charger, exhaust silencer, and vibration isolators.
- E. Test Reports - Indicate results of performance testing.
- F. 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.
- G. Manufacturer's Field Reports - Submit under provisions of this section and Section 01400. Indicate procedures and findings.

1.05. OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Sections 01700 and 16055.
- B. Operation Data - Include instructions for normal operation.
- C. 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.

1.06. QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 110.
- B. Maintain one copy of document on site.

1.07. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum three years' documented experience, and with service facilities within 100 miles of Project.
- B. Supplier - Authorized distributor of specified manufacturer with minimum three years' documented experience.

1.08. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70 and NFPA 110.

- B. Furnish products listed and classified by Underwriters Laboratories or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.09. PRE-INSTALLATION CONFERENCE

- A. Convene one week prior to commencing work of this section, under provisions of Section 01039.

1.10. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Accept unit on site on skids. Inspect for damage.
- C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.

1.11. MAINTENANCE SERVICE

- A. Furnish service and maintenance of engine generator for one year from Date of Substantial Completion.

1.12. WARRANTY

- A. Five-year manufacturer's standard warranty, including all labor.

1.13. MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Section 01700.

1.14. EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.
- B. Provide two of each fuel, oil and air filter element under provisions of Section 01700.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Onan - Model 150 GFPA (design basis).
- B. Caterpillar.
- C. Substitutions - Under provisions of Section 01600.

2.02. PACKAGE ENGINE GENERATOR SYSTEM

- A. Description - NFPA 110, engine generator system to provide source of power for Level 2 applications.
- B. System Capacity - 150 kW, 188 kVA at elevation of 1,000 feet (305 m) above sea level, rating using engine-mounted radiator.

- C. The generator shall be capable of starting and powering the loads in one step as listed in the table at the end of this section.

2.03. ENGINE

- A. Type - Liquid-cooled inline or V type, four-cycle internal combustion engine. Minimum displacement of 8.8l or 537 CID.
- B. Rating - Sufficient to operate under 10 percent overload for one hour in an ambient of 90 degrees F (32 degrees C) at elevation of 1,000 feet (305 m).
- C. Fuel System - Natural gas.
- D. Engine Speed - 1800 rpm.
- E. Governor - Isochronous type to maintain engine speed within 0.5 percent, steady state, and 5 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes.
- F. Safety Devices - Engine shutdown on high water temperature, low oil pressure, overspeed, low coolant level, and engine overcrank. Limits as selected by manufacturer.
- G. Engine Starting - DC starting system with positive engagement, number and voltage of starter motors in accordance with manufacturer's instructions. Include remote starting control circuit, with Manual-Off-Remote selector switch on engine generator control panel.
- H. Engine Jacket Heater - Thermal circulation-type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F (32 degrees C), and suitable for operation on 120 volts AC.
- I. Radiator - Radiator using glycol coolant, with blower type fan, sized to maintain safe engine temperature in ambient temperature of 122 degrees F (50 degrees C). Radiator air flow restriction 0.5 inches of water (1.25 Pa) maximum.
- J. Engine Accessories - Fuel filter, lube oil filter, intake air filter, lube oil cooler, fuel transfer pump, fuel priming pump, water pump. Include fuel pressure gauge, water temperature gauge, and lube oil pressure gauge on engine/generator control panel.
- K. Mounting - Provide unit with suitable spring type vibration isolators and mount on structural steel base.

2.04. ALTERNATOR

- A. Generator - NEMA MG1, three phase, four pole, reconnectible brushless synchronous generator with brushless PMG exciter.
- B. Rating - 150 running kW, 188 running kVA, at 0.8 power factor, 208Y/120 volts, 60 Hertz at 1800 rpm and 607 starting KVA @ 90% sustained voltage.
- C. Insulation Class - H.
- D. Temperature Rise - 105 degrees C.
- E. Enclosure - NEMA MG1, open drip proof.

- F. Voltage Regulation - Include generator mounted volts per hertz exciter regulator to match engine and generator characteristics, with voltage regulation ± 1 percent from no load to full load. Include manual controls to adjust voltage droop, voltage level (± 5 percent) and voltage gain.

2.05. ACCESSORIES

- A. Exhaust Silencer - Critical-type silencer, with muffler companion flanges, tailpipe, rain cap, flexible stainless steel exhaust fitting, sized in accordance with engine manufacturer's instructions, and condensate drain with plug type drain valve in accordance with manufacturer's recommendations. The drain shall be piped with copper tubing to the closest sump or waste drain.
- B. Batteries - Heavy duty, diesel starting type lead acid storage batteries, 170 ampere hours minimum (700 cold cranking amps) capacity. Match battery voltage to starting system. Include necessary cables and clamps.
- C. Battery Tray - Treated for electrolyte resistance, constructed to contain spillage.
- D. Battery Charger - Current limiting type designed to float at 2.17 volts per cell and equalize at 2.33 volts per cell. Include overload protection, full wave rectifier, DC voltmeter and ammeter, and 120 volts AC fused input.
- E. Line Circuit Breaker - NEMA AB 1, molded case circuit breaker on generator output with integral thermal and instantaneous magnetic trip in each pole, sized in accordance with NFPA 70. Include battery voltage operated shunt trip, connected to open circuit breaker on engine failure. Unit mount in enclosure to meet NEMA 250, Type 1 requirements.
- F. Engine Generator Control Panel - NEMA 250, Type 1 generator-mounted control panel enclosure with engine and generator controls and indicators. Include provision for padlock and the following equipment and features:
 - 1. Frequency Meter - 45 65 Hz. range, 3.5 inch (89 mm) dial.
 - 2. AC Output Voltmeter - 3.5 inch (89 mm) dial, 2 percent accuracy, with phase selector switch.
 - 3. AC Output Ammeter - 3.5 inch (89 mm) dial, 2 percent accuracy, with phase selector switch.
 - 4. Output voltage adjustment.
 - 5. Push-to-test indicator lamps, one each for low oil pressure, high water temperature, overspeed, and overcrank.
 - 6. Engine start/stop selector switch.
 - 7. Engine running time meter.
 - 8. Oil pressure gauge.
 - 9. Water temperature gauge.
 - 10. Auxiliary Relay - 3 PDT, operates when engine runs, with contact terminals prewired to terminal strip.

11. Additional visual indicators and alarms as required by NFPA 110. Level 2 use.
 12. Remote Alarm Contacts - Pre wire SPDT contacts to terminal strip for remote alarm functions required by NFPA 110.
- G. Provide alarm horn, and indicators and alarms as follows:
1. High battery voltage (alarm).
 2. Low battery voltage (alarm).
 3. Low fuel (alarm).
 4. System ready.
 5. Anticipatory high water temperature.
 6. Anticipatory low oil pressure.
 7. Low coolant temperature.
 8. Switch in off position (alarm).
 9. Overcrank (alarm).
 10. Emergency stop (alarm).
 11. High water temperature (alarm).
 12. Overspeed (alarm).
 13. Low oil pressure (alarm).
 14. Line power available.
 15. Generator power available.
 16. Lamp test and horn silence switch.
- H. Weather-Protective/Sound Limiting Enclosure
1. Critical silencer mounted within the enclosure, with rain cap and rain shield.
 2. Lockable access doors for control panel and service points.
 3. All door hardware, latches and hinges made of stainless steel.
 4. Air Louvers - If motorized, the louver shall be temperature controlled to prevent unit from overheating after engine shutdown.
 5. The enclosure shall keep the sound level output to 76.5 dB at 23 feet (7 m) from the radiator end while the unit is running under full load.

- I. Vibration Isolators - Mount generator on adjustable spring isolators complete with side movement snubbers. At least four such isolators shall be utilized and be sized to load the spring within their proper working range for the unit supplied.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.02. FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400 and specified herein,
- B. Field testing shall not take place until the generator and all associated systems are operational as determined by the Engineer.
- C. Provide full load test utilizing portable resistive load bank for four hours minimum. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown and return to normal. Testing shall include a "cold start" pickup of loads (one shot or step loaded per this section), full load test, and shutdown/cooldown.
- D. Record in 15-minute intervals during 4-hour test:
 - 1. Kilowatts.
 - 2. Amperes.
 - 3. Voltage.
 - 4. Coolant temperature.
 - 5. Room temperature.
 - 6. Frequency.
 - 7. Oil pressure.
- E. Test all alarm and shutdown circuits by simulating conditions.

3.03. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Prepare and start systems under provisions of Section 01400.
- B. The Contractor will arrange for the supplier of the engine generator to furnish the services of qualified service technician(s) to perform the following:

Service	Minimum Time at Plant Site
Observe the installation and test and calibrate the system. ⁽¹⁾	1/2 day (4 hours)
Instruct Owner's operators in the operation, maintenance, and repair of the entire system.	Two 1/2-day (4-hour) sessions ⁽²⁾

- (1) If manufacturer's representative determines that the installation is not complete or is not acceptable or corrections to any part of the installation are required, the Contractor shall, at his expense, make all necessary modifications or corrections and reschedule the testing and calibration test. Cost of the rescheduled session is also at the Contractor's expense. A written report of findings shall be delivered in duplicate to the Engineer.
 - (2) The first session shall be scheduled two weeks in advance of the actual date of instruction. The actual day shall be scheduled with the Engineer and Owner. The second session will be as requested by the Owner at some time during the warranty period.
- C. The Owner's initial instruction session for operation, maintenance, and repair of the entire system shall be digitally taped (placed on CD) by the Contractor at his expense. CD shall be left with the Owner. If the CD is not of good quality, as determined by the Owner, the Contractor shall have the service technicians redo the instructional session with an additional CD made for the Owner's use. This second instructional session and taping are also at the Contractor's expense.
- D. All times are actual on-site times. All costs, including overtime, travel, and subsistence are the responsibility of the Contractor.

3.04. ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust generator output voltage and engine speed.

3.05. CLEANING

- A. Clean work under provisions of 01700.
- B. Clean engine and generator surfaces. Replace oil and fuel filters after load test.

3.06. DEMONSTRATION

- A. Provide systems demonstration under provisions of Section 01660.
- B. Describe loads connected to emergency and standby system and restrictions for future load additions.

Simulate power outage by interrupting normal source, and demonstrate that system operates to provide emergency and standby power.

Item	Phase	Voltage	HP/(KVA)	Step	Starter
Pump 1	3	208	30	4	Yes
Pump 2	3	208	30	6	Yes
Lights	1	120	(1)	1	N/A
Exhaust Fan	1	120	.5	1	N/A
Outlets	1	120	(1)	1	N/A
Control Panel	3	208	(4)	2	N/A
Battery Charger	1	120	(2)	1	N/A
Motor Actuated Vale MV-1	1	120	.58	1	N/A
Motor Actuated Vale MV-2	1	120	.58	1	N/A
Flow Meter FE-1/FIT-1	1	120	(.3)	1	N/A

Item	Phase	Voltage	HP/(KVA)	Step	Starter
Flow Meter FE-2/FIT-2	1	120	(.3)	1	N/A
UV Transmittance Analyzer	1	120	(.04)	1	N/A
Chlorine Analyzer	1	120	(.3)	1	N/A
Chlorine Feed Pump 1 Receptacle	1	120	(.3)	1	N/A
Chlorine Feed Pump 2 Receptacle	1	120	(.3)	1	N/A
UV Reactor 1	3	208	(6)	3	N/A
UV Reactor 2	3	208	(6)	5	N/A

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. All timers.
- H. Time delay relays.
- I. Electronic alternating relay.
- J. Relays.
- K. Uninterruptible power supplies.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01700 - RECORD DOCUMENTS
- C. Section 16055 - ELECTRICAL WORK
- D. Section 16161 - CONTROL PANELS AND ENCLOSURES

1.03. REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control Systems
- B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems
- D. NEMA ST-1 - Standard for Specialty Transformers (Except General Purpose Type)

1.04. SUBMITTALS

- A. Submit shop drawings under provisions of Sections 01300 and 16055.

- 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 Sections 01300 and 16055.
- 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.
- F. Submit samples as requested by the Engineer.

1.05. PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01700.
- B. Accurately record actual locations of control equipment. Revise diagrams included in Drawings to reflect actual control device connections.

1.06. OPERATION AND MAINTENANCE DATA

- A. Submit operation data under provisions of Section 01700.
- B. Include instructions for adjusting and resetting time delay relays, timers, and counters.
- C. Submit maintenance data under provisions of Section 01700.
- D. Include recommended preventive maintenance procedures and materials.

1.07. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum three years' 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 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.
 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.
- C. Indicating Pilot Lights (IL)
1. Glass or plastic lens.
 2. 120-volt LED transformer 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	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. 24-HOUR TIMER

- A. General - Microprocessor based, 24-hour time switch with 288 setpoints in multiples of 5 minutes.
- B. Characteristics
 - 1. Input Power - 120 volts ac.
 - 2. Operating Temperature - -20 degrees C to 50 degrees C.
 - 3. Outputs - Single channel, Form "C" dry contacts, minimum 10 amps resistive at 120 volts.
 - 4. Display - Liquid crystal with AM/PM or 24-hour format.
 - 5. Enclosure - Non-metallic, NEMA 3.
 - 6. 24-hour lithium battery backup.
 - 7. Capable of manual override of "On" or "Off" of the next scheduled event.
- C. Manufacturer - Tork, Model DGS 180; or Paragon EC 11.

2.06. SEVEN-DAY TIMERS

- A. Two-channel, 7-day programming capability with a minimum of 16 setpoints per day.

- B. 24-hour clock format with LCD display and keyboard.
- C. Enclosure - NEMA 1 metallic.
- D. Power - 120 VAC.
- E. Calendar - 365-day programmable daylight savings time adjustment, automatic leap-year correction, and 12 single-day and 2 multiple-day holidays.
- F. Output Contacts - SPDT rated at 15 amps at 120 VAC.
- G. Provide with a minimum of 24-hour battery backup.
- H. Manufacturer - Paragon Electric Company, Model EC72; Tork Model DT200 or DS200.

2.07. MOTOR-DRIVEN RESET TIMERS (MTR)

- A. Synchronous motor driven type.
- B. Calibrated dial adjustment of time setting as well as indication of expired time.
- C. Manufacturer - Eagle Signal Division HP 5 Series, ATC Series 305.

2.08. MOTOR-DRIVEN CYCLE TIMERS

- A. Permanent-magnetic synchronous motor driven type with a dial calibrated in 1 percent graduation from 3 percent to 97 percent with a 100 percent full setting or time ranges of from 30 seconds to 60 hours.
- B. Accuracy - ± 2 percent of full scale.
- C. Repeatability - ± 1 percent of full scale.
- D. Manufacturer - Cycle timers shall be Eagle Signal Division HG100 Series for time range, ATC Series. Eagle Signal Division HQ9 Series for percent timer, ATC Series.

2.09. ELAPSED TIME METERS (ETM)

- A. Minimum six-digit, non-resettable hour meter panel mounted.
- B. For operation on 120 volts.
- C. Manufacturer - General Electric.

2.10. 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.

2.11. GENERAL PURPOSE CONTROL RELAYS (CR)

- A. Units shall be plug-in type.
- B. 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.

2.12. ELECTRONIC ALTERNATING RELAY (ALT)

- A. Relay type.
- B. Contacts - Rated 10 amps at 120 VAC.
- C. Electronic, continuous duty, capable of duplex or triplex operation.
- D. UL listed.
- E. Manufacturer - Diversified Electronics No. ARA-120-AME.

2.13. UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. Minimum Watt Capacity - As required to maintain power to equipment for normal operation for a period of 24 hours.
- B. Battery energy storage.

- C. Automatic recharging of batteries.
- D. Four 120-volt, 5-15R, output receptacles.
- E. Alarms - Battery backup operation, low run time remaining, and overload.
- F. Automatic current and overvoltage output protection.
- G. Operating Input Voltage - 88 VAC - 138 VAC.
- H. No interruption (no transfer time for normal power to battery backup) of power to the computer workstation.
- I. Efficiency - 95 percent.
- J. Brown-out protection for input voltages of 88 VAC without the use of the batteries.
- K. Lightning and Surge Protection - ANSI/IEEE C62.41 Categories A and B with 0.3 percent to 0.7 percent.
- L. Radio Frequency Noise Isolation - 38 Db common mode, 47 Db normal mode.
- M. Provide a minimum of a NEMA 4 wall-mounted enclosure for external mounted UPS.
- N. Manufacturer - Best, Liebert.

PART 3 EXECUTION

3.01. GENERAL

- A. Mount all individual controls in a suitable enclosure as specified per Section 16161.
- B. Identify all auxiliary controls per Section 16055.

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. PUSHBUTTONS AND SELECTOR SWITCHES

- A. Units shall be back-mounted wherever possible.

END OF SECTION

SECTION 17000
INSTRUMENTATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. This section includes the general work description and requirements for instrumentation provided by this contract.

1.02. GENERAL REQUIREMENTS

- A. It is a requirement of this specification that all Division 17 specifications be provided by a single supplier. This supplier shall have total responsibility for the entire system performance and compatibility of this section, as well as all other Division 17 specifications.

1.03. RELATED SECTIONS

The specifications sections listed below are an integral part of this equipment specification and the Contractor shall be responsible for providing these sections to the equipment suppliers:

- A. Section 01300 - SUBMITTALS
- B. Section 01640 - EQUIPMENT-GENERAL
- C. Section 16055 - ELECTRICAL WORK
- D. All Division 17 specifications.

1.04. REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 3 - Industrial Systems.
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- D. NFPA 70 - National Electrical Code (NEC).
- E. NFPA 79 – NEC (Labeling).
- F. ISA - Standards 5.1 and 5.4.
- G. IEC 1131-3 – Programming Standards.

1.05. SHOP DRAWINGS

- A. All Division 17 specifications shall be submitted in one shop drawing. Requirements of individual specification sections shall be contained within a single section in the shop drawing submittal. Indicate individual specification sections with a protruding tab. Submit material in the format and order as described in paragraph 1.05.B.3.

B. Shop Drawing Submittal Format

1. Shop drawings shall be in a rigid three-ring binder. If necessary, provide multiple binders.
2. Provide title page on the front and sides of the binder. Title page shall include job name, GHD job number, Contractor(s) job number(s), date, "Division 17 Shop Drawing," Contractor and supplier(s) names, addresses, contact persons, and contact numbers.
3. Contents shall be organized accordingly.
 - a. Table of Contents – List of each section. Provide protruding tabs labeled with the pertinent heading for each section listed in the Table of Contents.
 - b. For each Division 17 specification section, provide the following within the respective sections:
 - 1) Performance Affidavit – In format set forth in Section 01640.
 - 2) Table of Conformance.
 - 3) Training itinerary.
 - 4) Bill of Materials (BOM) for installed equipment, BOM for spare parts, and BOM for extra materials. Each BOM shall be grouped and identified separately.
 - 5) Equipment information satisfying specifications. Provide protruding tabs for each piece of equipment. Label each tab with the equipment manufacturer.
 - c. AutoCAD Drawings – Include title block, border, page numbers, and supplier job number. CD containing all Division 17 AutoCAD 2014, or higher, *.dwg files. Sheet/drawing titles shall utilize three lines in the title block and are subject to approval, and instructed change, by the Engineer.
4. AutoCAD drawings shall be 11-inch by 17-inch.
5. Shop drawings not containing the appropriate performance affidavit(s), date dependency affidavit(s), or format will be returned without further review.

C. Shop Drawing Submittal Contents - The following requirements pertain to all of Division 17 specifications and are intended to complement the requirements of Section 01640. Refer to individual Division 17 specifications for further requirements.

1. Performance affidavits for all equipment.
2. Include a complete Table of Conformance to each paragraph, or part, of Part II in the respective specification. Use a Microsoft Word 2010 table format with four columns labeled as "Specification Section," "Equipment Manufacturer," "Equipment Model," "Compliant (Y/N). If No, specify". As a minimum, identify equipment compliance in the "Compliant (Y/N). If No, specify" column for each article (i.e., 2.02), letter heading (i.e., A, B, C), and each number heading (i.e., 1, 2, 3). For exceptions or deviations, include a narrative description as to how the deviation or exception can benefit the system over that which is specified.

3. Training Itinerary – Detailed itinerary for the training to be provided in Microsoft Word 2010 table format. Itemize the day of training (“Day 1,” “Day 2,” or “Hour 1,” “Hour 2,” etc.) and the lessons to be taught during that period. Further discuss the equipment to be used during training and the proposed location of training for that day. Account for all days of specified training. Provide one training itinerary sheet for each training period. At the top of each sheet provide a header description of the training session and duration of training to be provided.
4. Detailed Bill of Materials in Microsoft Word 2010 table format, or Excel 2010, identifying component name, manufacturer, model number, and quantity supplied. Typical Bills of Materials are not acceptable.
5. Descriptive lists of spare parts and extra materials provided in the same tabular format as the Bill of Materials. Lists shall be exclusive to the spare parts and extra materials requested by the specification section, hence separate from the Bill of Materials for installed equipment. Lists shall be intuitive and specifically created for this project.
6. For individual equipment, submit information satisfying every item discussed in Part II of that specification section. Additionally, submit on all supporting accessories including, but not limited to, terminal blocks, surge and lightning suppression, UPSs, fuses, and cabling.
7. AutoCad 2014 or Higher Drawings - Provide loop and block diagrams. Symbols used and nomenclature shall be in accordance to ISA Standard 5.4. Diagrams shall be specific to the equipment submitted with the options and features specified or otherwise provided. The inclusion of options not specified or provided is unacceptable. Terminal points depicted shall be the terminal points provided with identical terminal point designations as the supplied equipment. Illustrate all available terminals that are not utilized.
8. Proposed nameplate wording. Scaled illustrations for each nameplate provided.
9. Manufacturer’s literature and Web site printouts are independent of the above requests for information and, hence do not satisfy the above shop drawing requirements. All catalog cuts, Web site printouts, manufacturer’s specifications, and drawings shall be clearly marked to allow identification of the specific products used. Cross-out all options and functions not supplied with the equipment.
10. Electrical power requirements, connection requirements, interconnecting cabling, and environmental limitations/restrictions.
11. Dimensions and weights of the equipment with the specified options.

1.06. OPERATION AND MAINTENANCE DATA

- A. The following requirements pertain to all of Division 17 specifications and are intended to complement the requirements of Section 01640 as well as individual Division 17 specifications.
- B. Submit under provisions of Sections 01600 and 01640.
- C. Provide complete sets of hard-covered three-ring bound loose leaf operation and maintenance manuals. In addition to “as-built” system drawings, the manuals shall include

internal wiring diagrams and operating and maintenance literature for all components provided under Division 17. Binders shall not be larger than 3-inch.

- D. Utilize a Table of Contents listing major headings (blue tabs) and sub-major headings (white tabs). Provide protruding tabs labeled with the pertinent heading for each item listed in the Table of Contents. Tab labels shall be permanently fixed to semi-rigid section dividers. Otherwise, utilize the same format as specified for shop drawing submittals.
- E. Submitted literature shall be in sufficient detail to facilitate the operation, removal, installation, programming and configuration, adjustment, calibration, testing, and maintenance of each component and/or instrument. Indicate application conditions and limitations of use stipulated by the product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- F. In a separate binder, include the configuration settings for each instrument provided in Division 17. Provide a Table of Contents with protruding tabs for each instrument. Label each protruding tab with the equipment name and equipment designation. Indicate the value of all configuration parameters and setpoints, including those that are not utilized in the equipment's field configuration.
- G. Contractor shall review all submitted literature and cross out all options, functions, warranties, etc. not part of the supplied equipment.

1.07. PROJECT RECORD DOCUMENTS

- A. The following requirements pertain to all of Division 17 specifications and are intended to complement the requirements of Section 01640 as well as individual Division 17 specifications.
- B. Submit under provisions of Sections 01600, 01640, and 16055.
- C. Record actual locations of controller cabinets and input and output devices connected to system. Include interconnection wiring and cabling information, and terminal block layouts in controller cabinets.

1.08. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Sections 01600, 01640, and 16055.
- B. Accept products on site in factory containers unless system is completely integrated into a pre-manufactured panel that has been factory tested. Inspect for damage.
- C. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

1.09. COORDINATION

- A. Refer to Contract Drawings for designations and verify with Owner.
- B. Coordinate demonstration to Owner with the Contractor and the Owner.

1.10. TRAINING

- A. Contractor shall video-record all training sessions. Provide a video recording of each training session on a single DVD. Provide two duplicate DVDs for each training session and distribute

one copy to the Owner and one to the Engineer. Provide computer-generated adhesive labels on each DVD. Label each DVD with the training session description, date training occurred, attendees, trainer, contact information, the equipment covered during the training session, and the project title.

- B. Engineer will review their copy for video quality including, but not limited to, picture quality, use of camera angles, and sound recording quality. Video must be clearly audible. If Engineer deems the video or audio quality as poor, the Contractor shall conduct the training session again (with original attendees present) and re-record the session at no additional cost to the Owner.
- C. Provide a DVD case to hold all training tapes provided for Division 17 specifications.

PART 2 PRODUCTS

2.01. ACCESSORIES

A. Nameplates

1. Laminated plastic nameplates shall be provided for each instrument in Division 17.
2. Nameplates shall have 5/16-inch high capital, white letters on black background machine engraved. Hang nameplates from process-mounted instruments via metallic chains. Nameplates shall be hung within 12 inches of the equipment.
3. Final wording on nameplate shall be submitted during the shop drawing phase and approved by the Engineer.
4. Nameplates shall be uniformly mounted and of identical form-factor for all equipment that nameplates are provided. Once a nameplate format has been selected, the format shall be utilized for all equipment throughout, thereby excluding providing original equipment manufacturer (OEM) nameplates.
5. Where wire labeling is not conducive to nameplate tagging as specified above, such as in MCC compartments or inside the programmable logic controller (PLC) enclosure, provide wire labeling on computer printed, adhesive tape, and wraparound wiring. Printing that is capable of being rubbed off the wire label is not acceptable.
6. Text on nameplates shall be as follows.
 - a. First Line – Equipment name. Equipment name shall as listed on the Contract Drawings and PLC input/output (I/O) lists.
 - b. Second Line – Equipment designation. Shall be in accordance with ISA Standards 5.1 and 5.4 as listed in the PLC I/O lists and on the Contract Drawings.
 - c. Third Line – Wiring destination. Indicate the destination of the wiring (i.e., PLC-1, PLC-2, MCC-PI, etc.).

B. Lightning and Surge Protection (TVSS)

1. Provide lightning and surge protection on the power supply of each instrument provided under Division 17.

2. Provide lightning and surge protection on all analog input and output signal circuits that pass out of doors or are terminated to metallic piping that passes out of doors.
3. TVSS devices mounted on the analog output signal wiring of field-mounted transmitters shall be conduit-mounted utilizing a common chamber, three element, gas tube and clamp incoming transients to a level acceptable to the transmitter it is protecting. Manufacturer shall be Joslyn, Model 1669-01, or equal.
4. TVSS devices protecting analog circuits entering the PLC enclosure shall be din-rail mounted with removable terminal blocks on each side of the device with no interruption of the incoming signal by unplugging the TVSS device. Device shall possess the capability of discharging 1000 Amps evaluated on an 8x20-microsecond waveform. Device shall have an LED to indicate the unit is functioning properly. TVSS device shall be manufactured by M-System Co, Model MDP-24-1, or equal.

C. Wiring/Conduit/Mounting

1. The Contractor shall provide all power wiring and conduit to each instrument specified in Division 17.
2. The Contractor shall provide all signal wiring and conduit from the PLC to new and existing equipment as specified in the I/O list of Section 17100 and the Contract Documents.
3. The Contractor shall provide all other wiring integral to supplied equipment to achieve the specified system performance as discussed individual Division 17 sections.
4. The Contractor shall mount all equipment specified in Division 17 in locations discussed/shown in the Contract Documents.

PART 3 EXECUTION

3.01. EQUIPMENT MOUNTING

- A. All mounted equipment shall have sufficient clearance from other provided or existing obstructions (including walls, pipes, conduit, or other instruments) to facilitate removal, adjustment, inspection, and calibration of the installed device. Any device that is mounted without sufficient clearance to perform these functions with standard, manufacturer recommended tools shall be removed and remounted at no additional cost to the Owner.
- B. Rotate equipment heads as directed by the Engineer in the punch list for final completion.

END OF SECTION

SECTION 17010

CONTROL SYSTEMS INTEGRATOR

PART 1 GENERAL

1.01. SUMMARY

- A. This section specifies the requirements of the Control Systems Integrator (CSI). The Contractor is required to subcontract a CSI with qualifications and a scope of work as specified herein.

1.02. SCOPE OF WORK

- A. The CSI shall provide testing and startup services to assist the Contractor with commissioning of the process control system and related instrumentation.
- B. Termination and labeling of conductors as specified herein
- C. Division 17 - Complete responsibility for the provision of all Division 17 requirements, including equipment and services, as specified in the respective specification.
- D. Provide manufacturer's configuration and startup services for new control panels.
- E. Existing Conditions - Modify existing control circuits and control panels as required by the Contract Documents and specifications.
- F. Supply quantities of CSI field technician personnel as specified herein for the duration necessary for system installation, startup and commissioning of the new systems, and upgrades of existing systems.
- G. Provide manufacturer's services for installation, configuration and testing of equipment where specified. Manufacturer's representatives who are not under direct employment of the equipment manufacturer are permitted only where specified in the Contract Documents.
- H. Take ownership of all equipment being furnished through the CSI. Coordinate efforts associated with manufacturer's technicians and representatives for services required during installation, configuration, calibration, startup, and troubleshooting of equipment. Coordination shall occur in a timely fashion as to not delay the project schedule.
- I. Fabrication, configuration, testing, startup, and implementation of the Process Control System (PCS), control panels, instrumentation, and electrical equipment as specified herein and required to construct a highly available, efficient, reliable, and operable system.
- J. Conduct and coordinate CSI coordination meetings and attend progress meetings as specified herein.

1.03. CONTROL SYSTEMS INTEGRATOR QUALIFICATIONS

- A. The CSI shall be regularly engaged in the business of instrumentation and controls and shall be responsible for the supply, coordination, and installation of the equipment as specified herein.

- B. The CSI shall demonstrate the requisite resources of in-house staff, facilities and finances to complete the project in the schedule specified. These resources shall include personnel who are direct payroll employees of the CSI to engineer, design, implement, fabricate, stage, and test the entire integrated hardware and software system at the CSI's facilities. In-house personnel shall include all disciplines associated with system manufacture, fabrication, and integration to include but not be limited to engineering, drafting, analog and digital control systems and wiring design, construction, wiring, labeling, software configuration, test/demonstration programming, project management, quality control, field engineering and training.
- C. The CSI shall assign a specific person to be the CSI Project Manager for this project. The Project Manager shall be a direct employee of the CSI, shall be assigned to this specific project, and shall be skilled and experienced in project management of the type of work described herein. The Project Manager shall be assigned for the period of the Contract. The Project Manager shall be responsible for managing the work, but not performing the work and, as such, the Project Manager shall not be responsible for drafting, wiring, training, programming, or fabrication. Should it become necessary to replace the CSI project manager, the Contractor shall submit to the Engineer the credentials of the person assigned as a replacement.
- D. The CSI shall maintain a UL 508 listed fabrication shop located at the CSI facility for the assembly of the various control panels, cabinets, consoles, instrument racks, enclosures, and wiring required for this project. This shop shall be available for inspection by the Engineer to observe quality control and workmanship. The CSI facilities shall include hardware and software owned by the CSI for development and support of any system software, testing, and demonstration equipment to be utilized on the project.
- E. Proximity to Project Site - Project team shall be within 2-hour driving distance to the project site. Panel fabrication shop shall be within 250 miles of the project site.
- F. Pre-Approved CSIs

Company	Location	Contact Person	Contact No.
Aaron Associates	478 West Main Street Waterbury, CT 06702		(203) 753-1536
Optimum Controls Corporation (OCC)	1301 Rosemont Boulevard Reading, PA 19604	Jim Brunnell	(610) 375-0990
Zeller Electric	1000 University Ave #800, Rochester, NY 14607		(585) 254-8840

1.04. DEFINITIONS

- A. Process Control System (PCS) - Network of one or more PLCs, PLC HMIs, and/or computers. Synonymous with the Supervisory Control and Data Acquisition (SCADA) system.
- B. Contract Documents - Comprised of both the Contract Drawings and Contract Specifications.
- C. Fieldbus Networks - Reference to a family of industrial network protocols. Fieldbus networks may include Foundation Fieldbus, Profibus, Profinet, Ethernet IP, Modbus TCP, Modbus Serial, Modbus 485, DH+, DeviceNet, ControlNet, and others.
- D. Resident Project Representative (RPR) - On-site team that enforces the Contract Documents and witnesses most demonstrations. May, or may not, be the design Engineer.

- E. Contractor - Where used herein, refers to the Prime, or General Contractor. The contractor to which this CSI is subcontracted.
- F. Project Team – Comprised of the Owner, Engineer, CSI, and Contractor.

1.05. CSI COORDINATION AND MEETING REQUIREMENTS

- A. The CSI shall collaborate with the Contractor in scheduling of all work.
- B. Schedule testing and demonstrations in writing with the Engineer and Owner at least two weeks in advance of the proposed date(s). Testing and demonstrations performed without prior written and acknowledged notice are unacceptable.
- C. The CSI shall perform the detailed integration and coordination of the control systems and furnish instrumentation equipment in accordance with this specification. Work shall be performed by the CSI's own staff and related equipment manufacturer's engineers (where applicable), including submittal drawings, operations and maintenance manuals, record drawings, equipment testing, operational demonstrations, and other applicable documentation.
- D. Coordination with Process Mechanical Equipment Manufacturers
 - 1. Coordinate with process mechanical equipment manufacturer's in order to obtain control system requirements and special control components. The CSI shall review and coordinate with the equipment manufacturer's submittals.
 - 2. The Engineer and RPR are not required to supply information to the CSI that is available from within this project's contract, including supplier information, when the CSI is capable of obtaining such information directly.
- E. The CSI shall take detailed meeting minutes (i.e., record of meeting discussions) for all meetings attended by the CSI. Meeting minutes shall:
 - 1. Identify all topics of discussion and all pertinent details of each topic.
 - 2. Identify the party that is speaking for each topic and each statement that is recorded.
 - 3. Categorize statements as ideas or agreed-upon actions.
 - 4. Record meeting date(s) and time(s), as well as attendees of the meeting.
 - 5. Be distributed to the project team within three business days of the meeting date.
- F. Required Meetings
 - 1. Initial Coordination Meeting - Schedule, coordinate, and host an initial coordination meeting with the Contractor, Owner, and Engineer to review the scope and schedule of the project. The meeting shall be attended by the CSI project manager and all other parties that are involved in the integration of the control system. CSI shall come equipped with the approved Detailed Work Plan.
 - 2. Pre-Submittal Review Meeting - The pre-submittal review meeting shall be held over one, four-hour meeting and shall be conducted within 30 working days of contract award. The Contractor shall take minutes of the pre-submittal conference. The pre-submittal review meeting shall feature:

- a. A list of equipment and materials required for the control system and the manufacturer's name and model number for each proposed item.
- b. A list of proposed outages. Outages may include:
 - 1) Power system outages associated with cut-over of equipment.
 - 2) Process equipment outages associated with the change-out of existing field instruments.
 - 3) Control system outages because of changes to PLC architecture or PLC communications architecture.
 - 4) Control system outages because of changes to soft-ware deployment and/or cut-over from existing PLC software to new PLC software.
- c. A list of proposed clarifications to the Contract Documents along with a brief explanation of each item. Resolution shall be subject to a separate formal submittal and review by the Engineer.
- d. The work plan shall include:
 - 1) Dates for all submittals and design fabrication.
 - 2) Dates for factory acceptance tests.
 - 3) Dates for deliveries.
 - 4) Dates for field testing.
 - 5) Dates for outages and cutovers anticipated for the project.
- e. An overview of the proposed training plan. The Owner's staff and Engineer shall review and may request changes. Changes to the proposed training shall be resolved in the pre-submittal conference. The overview shall include the following for all training:
 - 1) Course title and objectives.
 - 2) Any needed pre-requisite training and experience by the attendee.
 - 3) A topical outline.
 - 4) Course duration.
 - 5) Course format lecture, laboratory, or hands-on discussion.
- f. Develop the meeting agenda and distribute to the attendees a minimum of three days prior to the meeting for review. Update agenda with reviewer's comments and come prepared to address attendee's questions. Provide copies of all handouts for all attendees.

3. CSI Progress Meetings
 - a. Schedule, coordinate, and host CSI-specific progress meetings during the course of the project to coordinate integration requirements with the equipment manufacturers and Contractors. The CSI shall hold a minimum of 12 progress meetings at the project site. The progress meetings shall be held at an agreeable time for the Owner, Contractor, and Engineer. Additional meetings shall take place as required to coordinate the Work.
 - b. Develop the meeting agenda and distribute to the attendees a minimum of three days prior to the meeting for review. Update agenda with reviewer's comments and come prepared to address attendee's questions. Provide copies of all handouts for all attendees.
4. Equipment Modifications Field Meetings - Schedule, coordinate, and host on-site meetings with the Contractor, Owner, and Engineer as required to overview modifications to existing equipment and systems. The meeting shall be attended by the CSI project manager and all other parties involved in the integration of the control system.

1.06. QUALITY ASSURANCE

- A. References - Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified in the Contract Documents:
 1. ANSI - American National Standards Institute
 2. ASME - The American Society of Mechanical Engineers
 3. ASTM - The American Society for Testing Materials
 4. NEMA - National Electric Manufacturers Association
 5. UL - Underwriters Laboratories, Inc.
 6. ISA - Instrument Society of America
 7. IEEE - Institute of Electrical and Electronic Engineers
 8. NEC - National Electrical Code
- B. Quality Control
 1. All components shall be new and of the most current and proven design. All components shall be approved for the intended application and shall be installed and wired in accordance with the manufacturer's requirements.
 2. All new electrical equipment and control panels, and their components and materials shall be UL listed and labeled as a completed assembly.
- C. This specification is designed to engage the CSI at key stages throughout the project so as to promote a formalized and repeatable process for quality control and quality assurance. CSI qualifications, submittals, meetings, workshops, coordination, and documents specified herein are designed to require more upfront planning, which is intended to align expectations

of all stakeholders and to deliver the project in an efficient and effective manner that is cost effective and beneficial to all stakeholders.

1.07. SUBMITTALS

- A. Submittals shall be submitted in accordance with the individual Division 17 specification requirements.
- B. Submittals shall include the following:
 - 1. CSI Qualifications Package – Shall accompany submitted bid proposal to project.
 - 2. Schedule of Values – Submit within 15 days of the Notice to Proceed. Schedule of Values shall be approved by the Engineer prior to submission of any payment applications.
 - 3. Detailed Work Plan - Submit within 15 days of the Notice to Proceed. Submittals sent to the Engineer from the CSI before the detailed work plan is approved will be returned Not Reviewed. In scheduling review time for the work plan, allocate time for three resubmittals before approval.
 - 4. Shop Drawings, Operations and Maintenance, and Project Record Documents - In scheduling review time for individual shop drawings, allocate time for a minimum of two resubmittals.
 - 5. Equipment Inventory, Calibration, and Validation (EICV) Workbook.
 - 6. Factory acceptance test plan, schedule, and forms.
 - 7. Field Testing, Demonstration, Validation - Shall be approved by the Engineer before any field tests are performed.

1.08. CSI QUALIFICATIONS PACKAGE

- A. The CSI shall submit a technical qualifications proposal along with the bid in accordance with Section 00100.
- B. Submit a CSI qualifications package for the proposed CSI for this project. The qualifications package shall include the following information which shall be organized and formatted as follows:
 - 1. Company Background - Provide a brief company overview detailing CSI's experience, capabilities, and available resources. Description of available resources shall include labor categories, staffing, equipment owned by the CSI and pertinent to this project, divulge all associations with manufacturers pertinent to this project, testing equipment owned by the CSI and pertinent to this project, and training staff and aids.
 - 2. Experience in Water and Wastewater Applications - Provide a list of recent (last five years from the bid opening date of this Contract) projects involving similar treatment facilities that the CSI has successfully completed. Each project shall be provided with the date of completion.
 - 3. Project Plan - Provide a brief project task list detailing the personnel to be utilized for engineering and design, fabrication, installation, startup, demonstration, and training

for this project. Include resumes for all personnel which will be performing services for this project. Provide name and resume for the proposed project manager for this project. Identify role(s) of each submitted individual.

- a. Provide resumes for all key staff, including field technicians who are assigned to perform installation, testing and demonstration services. All resumes shall be approved by the Engineer. Ensure that the resumes do not include senior personnel who will not have technical responsibilities associated with the project. The project organization shall include:
 - 1) Project managers.
 - 2) Project engineers.
 - 3) Software Engineers – Project experience must illustrate experience and proficiency with the HMI and ancillary software required on this project.
 - 4) Programmers - Project experience must illustrate experience and proficiency with the PLC programming software and with the process control routines (logic) required on this project.
 - 5) Communications engineer (radio).
 - 6) Designers.
 - 7) Startup and commissioning team members.
 - 8) Sub-consultants (where permitted)

4. Technical Support Plan

- a. Identify the location of the technical support facility that is nearest to the Owner's project site.
- b. Identify the number of staff members with the qualifications that are available and where these staff members are located in relation to the project job site.
- c. Identify how many business days it will take for a qualified representative of the entity that is familiar with the specificity of the system to arrive at the Owner's facility after notification of a system hardware problem that could not be corrected by plant staff.

5. Current Backlog - Identify the quantity of projects by other entities that are currently being worked on. Provide the following information for each project:

- a. Size of each in dollars.
- b. Quantity of PLCs/RTUs.
- c. Communications medium.
- d. Percentage complete.
- e. Estimated shipping date.

6. Quality Assurance Plan - Provide a brief summary of the CSI's in-place quality assurance plans for performing work from engineering through startup and training.
7. Facilities and Equipment - Provide a detailed list of office and fabrication space, location where fabrication of panels will take place, and available meeting facilities. List numbers and types of Computer Aided Drafting software and workstations that are available for this project.
8. Reference Letters - Provide a minimum of five reference letters summarizing the CSI's performance on similar projects. Reference letters shall be from Contractors or Owners that have had contractual relationships with the CSI on similar projects.

1.09. SCHEDULE OF VALUES

- A. Progress payments for lump sum items will be made based on the percentages of completion of the work items included in the Schedule of Values for each lump sum item. Progress payments for Unit Price Work will be based on actual quantities of work performed.
- B. CSI shall develop and maintain a Schedule of Values that accommodates the entirety of the CSI's scope of work.
- C. Format
 1. Shall be developed using an off-the-shelf payment application program or be created and tracked in Microsoft Excel.
 2. Include columns with calculations as follows: Item Number; Item Description; Unit (Lump Sum, Each, Lineal Foot, etc.); Unit Price; Contract Value (Quantity * Unit Price); Quantity Completed; Completed Value (Unit Price * Quantity Completed); Percent Complete (Completed Value/Contract Value); Balance to Finish (Contract Value – Completed Value); Retainage (Completed Value * Specified Retainage Percentage); additional columns as necessary.
 3. Rows to summarize Total Completed Value (in USD dollars), Total Percent Complete, Balance to Finish, and Total Retainage.
- D. Minimum Resolution of Work Items – Utilize the following guidelines to identify the quantity of line items required in the CSI's Schedule of Values. Provide individual line items for:
 1. Mobilization.
 2. Each unit price item.
 3. Each PLC or control panel with the following sub-items:
 - a. Approval of shop drawings.
 - b. Successful demonstration and documentation of Factory Acceptance Tests (FATs).
 - c. Installation of completed assembly, i.e., complete control panel.
 - d. Successful completion and documentation of final point-to-point testing.
 - e. Successful completion of pre-startup program demonstration.

- f. Completion of all punch list items associated with the hardware and software associated with the completed assembly.
- 4. Individual Types of Instrumentation
 - a. Approval of shop drawings.
 - b. Installation of instrument.
 - c. Successful completion and documentation of specified startup services.
 - d. Completion of associated punch list items.
- 5. Project record documents.

1.10. DETAILED WORK PLAN

- A. Submit an overall work plan that details tasks to be performed on this project in sufficient detail to demonstrate a complete understanding of the CSI's scope of work, interdependency of tasks and milestones, sequence of construction, and realistic duration of tasks.
- B. Contents shall address and include:
 - 1. Schedule - Electronically generated schedule that identifies all tasks required of the CSI, including individual entries for overall project milestones, each shop drawing, submittal dates for each submittal required above, specified meetings, fabrication periods for individual PLCs, testing periods for individual PLCs, installation and network testing of networks, modifications to existing components and systems, installation acceptance, final acceptance, and training periods for equipment. Refer to Section 01640 and individual Division 17 sections for required installation acceptance, final acceptance, and training days required.
 - 2. Communications Plan - Provide an organizational chart for the CSI, including email, office phone, office fax, and mobile phone numbers for all project participants. Submit a communications plan that allows communication directly between the Engineer and one contact within the CSI's organization. Include written authorization from the CSI's prime contractor that also establishes the terms of Engineer-to-CSI correspondence.
 - 3. Risks - Identify any risks to delivering the scope of work on time and on budget. Identify any long lead time equipment items. Present recommended solutions to mitigate identified risks.
 - 4. Outages - Provide a detailed plan that identifies all outages that will be required during construction to complete the project. The plan shall identify the following:
 - a. Sequence of outages.
 - b. Equipment, PLC, or system that will be affected by each outage.
 - c. Duration of each outage.
 - d. Proposed date(s) for each outage.
 - e. List of specific tasks to be completed during the outage.

- f. Means by which equipment can be controlled if a PLC is removed.
- g. If the outage requires a process shutdown.
- 5. CSI initial coordination meeting agenda.
- 6. CSI progress meeting agenda template.

1.11. SHOP DRAWINGS, OPERATIONS AND MAINTENANCE, AND RECORD DOCUMENTS

A. Shop Drawings

- 1. Equipment shall only be ordered after shop drawings have been reviewed and approved by the Engineer. Equipment procured without Engineer approval may need to be uninstalled, returned, exchanged, and/or replaced at the Contractor's cost. Equipment ordered that does not address the entire Engineer's shop drawing comments are subject to complete replacement, rather than refurbishment or modification, if modification of the supplied unit impacts aesthetics, intended functionality, schedule, or cost at the Engineer and Owner's option.
- 2. If deviations to the Contract Documents are proposed, the CSI shall submit a detailed description and explanation for each proposed deviation to the Contract Documents.

B. Shop drawing, operations and maintenance, and project record document requirements of Section 17000, Instrumentation, are intended to complement submittal requirements of individual specification sections. Refer to Section 17000, Instrumentation, for additional requirements and format in preparing individual section submittals.

C. Record Drawings

- 1. Submit complete and accurate record drawings reflecting all changes and modifications made during installation and testing of the equipment and systems.
- 2. Record drawings shall be submitted electronically on DVD or removable USB drive with the specified number of sets of prints. Once the record drawings are reviewed by the Engineer, the CSI shall incorporate the Engineer's comments, submit required number of sets, and shall submit two copies of the electronic files for each record drawing shall be submitted. Files shall be formatted in AutoCAD (.dwg) format. A list of drawing files with corresponding drawing titles shall be provided in electronic format. Record Drawings shall be provided after conditional acceptance of the facility is approved and shall include all field changes and design modifications made during construction.

1.12. EQUIPMENT INVENTORY, CONFIGURATION, AND VALIDATION WORKBOOK GENERAL

- A. CSI shall populate and maintain an Equipment Inventory, Calibration, and Validation Workbook. This is a single workbook with multiple worksheets. An electronic copy of this Microsoft Excel 2010 workbook is available from the Engineer to the successful bidder.
- B. Update the entire workbook biweekly and remit updated copies electronically to the Engineer upon request, which may be as frequent as weekly.
- C. Testing and validation results shall be updated electronically in the field using the CSI's laptop computer.

- D. Entries on the sample sheet are for illustrative purposes only and do not indicate approved configurations or acceptable equipment.
- E. Workbook Contents
1. Instrumentation Calibration Worksheet - Contains calibration and configuration information, including, but not limited to, the equipment designation, equipment description, instrument details, analog output configuration, failsafe configuration, relay output configuration, and technician details. Columns include: Equipment Designation, Equipment Description, Technology, Instrument Details (Manufacturer, Model Line, and Model Number), Analog Output Characteristics, Process Value At Minimum Span, Process Value At Maximum Span, Units Of Measure, Failsafe Mode (Hold Last Good Value, Drive Signal Above 20 mA, Drive Signal Below 4 mA, Failsafe Not Available), Relay Outputs (Purpose and Function), Technician Who Performed Work (Company and Name). The Contractor shall include a five-point calibration check (0, 25, 50, 75, and 100 percent of spanned value). The instrumentation calibration work book shall include all HART parameters (where HART is available for the instrument).
 2. Fieldbus Network Configuration Worksheet - Worksheet identifies key configuration information for all networked devices. Columns include: Equipment Designation, Equipment Description, Equipment Type, Instrument Details (Manufacturer, Model Line, and Model Number), Communication (Protocol; Network Address, ID, or Node; Parameters), Failsafe Mode (Hold Last Good Value, Run or Open, Stop or Close, Other), Technician Who Performed Work (Company and Name).
 3. Testing and Validation Worksheet - One worksheet per PLC. Utilizes as-bid PLC I/O list in conjunction with additional 40 columns that correlate to the requirements of three phases of I/O testing by the CSI: factory acceptance testing, intermediate point-to-point testing, and final point-to-point testing. A testing work sheet shall include:
 - a. Name of the signal to be tested.
 - b. PLC where the signal resides (cabinet, rack, slot and point number).
 - c. PLC tag name.
 - d. Alarm assertion states (high, high-high low, low-low).
 - e. Confirmation of interlock actions associated with each alarm assertion state.
 - f. Confirmation of interlock actions associated with loss of communications.
 - g. Confirmation of interlock actions associated with loss of PLC processor.
 - h. Confirmation of interlock actions associated with loss of field device.
 - i. Confirmation of interlock actions associated with loss of PLC I/O card.
 - j. Confirmation of interlock actions associated with loss of power (ac or dc).
 - k. A confirmation that items are to be visible on HMI and change state.
 - l. A confirmation that items are to be visible on trending (where applicable).

1.13. FACTORY ACCEPTANCE TEST (FAT) SCHEDULE, PLANS AND FORMS

- A. The CSI shall obtain electronic copies of the Equipment Inventory, Configuration, and Validation Workbook from the Engineer and modify electronically to customize testing templates for this project.
- B. Submit a testing schedule for FAT of panels and associated PLC equipment test programs. The schedule shall list the location of panel fabrication, the location that the test will be conducted at, and the date the test will be conducted. Schedule shall be submitted a minimum of four weeks prior to conducting actual testing. Where revisions to the dates contained in the schedule become necessary, the CSI shall submit revised dates a minimum of seven calendar days prior to conducting actual tests in order to allow the Owner time to plan for witnessing the test. All factory acceptance tests shall be subject to observation by the Owner or designated representative. Shop testing shall be as specified herein.
 - 1. Utilize one copy of the Engineer-approved PLC shop drawing I/O module wiring diagrams as a checklist and simulate I/O states on the field instrument connect side of the PLC enclosure terminal strip. To test discrete points, physically make contact closures for all discrete signals. To test analog inputs, utilize a signal generator to drive a three 4-20 mA input signal, 4mA, 12 mA, and 20 mA. To test analog outputs, write three analog outputs in the basic PLC program and verify the signal using a digital multimeter, using 4 mA, 12 mA, and 20 mA as write values.
 - 2. Document the testing by marking up each point on the shop drawing. Supply the marked up shop drawing to the Engineer for approval before panel shipment.
- C. The CSI shall submit a factory acceptance test plan for each control panel indicating all tests and demonstrations to be performed. FAT plans shall include line items for verifying all components and wiring in the control panel are appropriately functional, inclusive of all control, instrumentation, network and power devices, cabling and wiring. Devices requiring interaction with field devices may be marked as "field test" and shall be tested during Point-to-Point testing witnessed by the Engineer.
- D. A FAT report shall be submitted for each panel furnished by the CSI. Test report shall include date and time of test, personnel conducting test, personnel witnessing test, name of panel and fabricator, location of test, test equipment utilized, and a detailed description of the actual tests performed. Reports shall include a list of items that failed the testing, what caused the failure and what remedy is to be done. CSI shall also note any additional conditions of the shop test that may be agreed to prior to or during the shop test of any given control panel.
- E. All shop testing involving networks shall utilize network addresses provided by the Engineer. Network addresses may be supplied by the Engineer two weeks prior to scheduled testing.
- F. The CSI shall develop and provide test programs for the PLC as required to demonstrate functionality of the system hardware components and communications through the system networks. The CSI shall configure, startup, and commission all network managed switches, fiber optic modules, network gateways, and other nodes on the PCS network.
- G. If the functional testing conducted at the factory does not meet the previously agreed-to requirements, the Contractor shall absorb all costs for materials, labor and schedule delays required to conduct a re-test of the components or software.

1.14. FIELD TESTING, DEMONSTRATION, AND VALIDATION

- A. The CSI shall submit a testing and demonstration plan for the equipment and instrumentation that is furnished and/or modified by the CSI. The plan shall consist of two main components: (1) testing; and (2) demonstration. Both testing and demonstration shall include individual field devices, individual pieces of equipment, and systems.
- B. Testing and demonstration of the components, equipment and systems shall include details of staff to be used, testing equipment to be used, listing of equipment and systems to be tested, and a detailed description for testing. Testing shall include final testing of calibrated ranges and actuation settings of instrumentation and field devices, testing of panel mounted controls and control stations, and testing of interlocks, status indication and alarms between panels and systems.
- C. The demonstration plan shall be similar to the testing plan in that the same tests shall be performed by the CSI as were performed during testing, for the purposes of demonstrating the operation of the individual pieces of equipment, instrumentation and systems. It shall also serve the purposes of completing a final checkout of the systems. For the purposes of preparing the plan, the CSI shall assume that a minimum of six persons employed by the Owner will be witnessing the tests. The Contractor shall notify the Owner in writing a minimum of seven calendar days prior to performing demonstration of operation of the equipment and systems.
- D. Requirements for testing and demonstration of operation of equipment described herein shall incorporate the requirements for testing and demonstration as specified in the individual Division 17 specification sections.
- E. Plan shall include CSI's participation in the unit process and plant-wide testing described in Section 01660, Testing and Startup.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. GENERAL

- A. Furnish equipment, materials and appurtenances in accordance with the requirements of technical specifications listed in Divisions 16 and 17.
- B. Coordinate with equipment manufacturers as required to obtain information, submittals, materials and equipment from manufacturers, and shall provide information, submittals, materials and equipment to equipment manufacturers as required to execute the work in accordance with the Contract Documents.
- C. Source Quality Control
 - 1. The CSI shall conduct shop acceptance tests for control panels and systems prior to shipment. The factory acceptance test shall demonstrate that the equipment performs in accordance with the Contract Documents.

2. Each control panel furnished by the CSI shall be assembled and wired so that it functions as a complete system for the FAT. Inputs to the control panels from field instruments and devices may be simulated during the test. Control panels shall be fully assembled with all devices functional prior to Engineer arriving for shop testing. The Engineer reserves the right to postpone FAT if it is deemed that the control panels are not ready to be tested.
3. The FAT shall demonstrate the proper operation of the configuration and control logic of devices described or indicated on the Contract Drawings and specifications.

D. Incidental Discovery of Existing Issues

1. Upon incidental discovery of an existing issue, notify the Owner immediately in writing.
2. Existing issues may include, but are not limited to the following:
 - a. Code violations.
 - b. Defective equipment.
 - c. Compromised equipment.
 - d. Disabled interlocks.

3.02. FIELD TERMINATIONS AND LABELING

- A. Terminations - CSI shall terminate signal wiring to instrumentation, equipment, and field-side of control panel termination strips.
1. Electrical Contractor shall pull conductors and cables to termination points with sufficient excess cable to enable the CSI to label, organize, and terminate each conductor.
 2. Terminations shall be limited to signal wiring, 24 VDC and 120 VAC power and control circuits, such as analog signals, discrete signals, fieldbus networks, and control logic, but shall not include three-phase power or power higher than 120 VAC. Scope of terminations include all equipment.
- B. Wire Labeling - Provide labeling of individual conductors terminated by the CSI.
1. Labels shall utilize a common format, appearance, and be installed with consistent and repeatable workmanship.
 2. Materials - Labels shall be comprised of a machine-printed polyester or polyvinyl film and utilize black text on a white background. Each label shall be a single adhesive film or shrink wrap tube. Combining multiple labels to comprise a single wire label is not acceptable.
 3. Method - Label conductors within 1 inch of each termination. Utilize the same, unique wire designation for the entire continuous segment of wire. All wire designations shall be a derivative of the equipment's designation to which it is connected.

4. Timeliness - Wires must be labeled prior to termination and equipment may not be commissioned without permanent wire labels in-place. Wire labeling shall be a prerequisite of equipment startup.
- C. Nameplates - Provide nameplates for all Division 17 and Division 16 equipment in accordance with nameplate requirements in Section 17000.

3.03. POINT-TO-POINT FIELD TESTING

A. Definitions

1. Equipment to be Tested - May include a PLC enclosure, control panel, or other device that requires point-to-point testing. It is the assembled panel that requires testing.
2. PLC I/O Lists - Tables located at the end of Section 17100 that identify all the signals communicated to each plant PLC. I/O list does not identify signals communicated to Original Equipment Manufacturer (OEM) PLCs that are typically specified in Division 11 specifications.
3. DMM - Digital Multi Meter. Device capable of sensing current in milliamps with a resolution of at least 0.01 mA, sensing continuity, sensing resistance with a resolution of 1 Ohm, and able to source 4 to 20 mA analog signals at a minimum of 0, 25, 50, 75, and 100 percent spans.
4. Signal - Includes a PLC input and output, a hardwired circuit between two field mounted devices or internal to a control panel, and a network signal like those available over Ethernet and fieldbus protocols.

B. Intermediate Point-To-Point Testing

1. Purpose

- a. To identify wires terminated on incorrect terminals, loose wires, wires with insufficient exposed metal or too much exposed metal, improper wiring practices, interference or noise
- b. To prove polarity of analog signals are correct; 4-20 mA circuits are grounded on one end only; circuits are appropriately powered as 24 VDC loop powered, 24 VDC 3-wire, or 120 VAC powered.
- c. To resolve all wiring and equipment issues to ensure that final point-to-point testing proceeds quickly and without interruption so as to conserve the time required by the party witnessing final point-to-point testing.
- d. To assess percent complete on Contractor payment applications.
- e. To assess readiness of the system for commissioning by the programmer.

2. Scope of Testing

- a. All signals specified in the I/O lists.
- b. All signals added during the shop drawing and/or construction phases.

- c. All fieldbus and Ethernet networks.
- 3. Prerequisites to commencing intermediate point-to-point testing:
 - a. Equipment to be tested shall be installed in its final location.
 - b. Equipment to be tested shall be powered by its permanent and final source of power.
 - c. Field wiring shall be pulled from the field devices to the equipment to be tested and shall be encased in the appropriate conduits.
 - d. Field wiring shall be labeled in the field, as well as inside the equipment to be tested.
 - e. Field devices are installed, commissioned as specified, powered, and all terminations have been completed.
 - f. All pending field orders associated with the equipment and workmanship of the systems to be tested shall be resolved.
 - g. All checklists shall be prepopulated by the CSI and their completed form submitted to the RPR for review and approval.
- 4. Testing Documentation
 - a. The CSI shall populate the Testing & Validation worksheet of the EQ Inventory, Configuration, and Validation workbook with all signals to be tested.
 - b. Update the workbook to identify any testing methods that are not pertinent to the signal as N/A (i.e., not applicable).
 - c. Complete all testing of each signal and identify the person(s) performing the test.
- 5. Each signal shall be verified by the CSI to ensure that the interconnecting wiring is complete and correct, and connected to the proper terminals at the points of termination.
- 6. Removal of a wire from a termination point within a previously tested circuit nullifies any previous testing of the circuit and necessitates retesting of the circuit following the complete point-to-point testing requirements in its entirety.
- 7. Method of Testing - In general, each signal shall be tested
 - a. Discrete Inputs - Manipulate the field element to evoke the signal excitation (change of state) indicative of the wired signal. Signals may jumpered only where it is impossible to evoke signal excitation without damaging or disassembling the field device in a manner not approved by the device manufacturer. For example, equipment shall be started/stopped, floats shall be manipulated, hand switches shall be manipulated, alarm outputs shall be forced at the instrument using self-test features, actuators shall be controlled open and closed using control integral to the actuator, etc. Verify signal excitation in PLC program and visually via PLC discrete input module LEDs.

- b. Discrete Outputs - Force an output from the PLC program and verify the field device responds as intended. Removal of wires anywhere in the circuit to insert a DMM to verify signal excitation is not an acceptable means of testing for any discrete output. For example, from the PLC program equipment shall be started/stopped, actuators shall be opened/closed, pilot lights shall be illuminated, etc.
 - c. Analog Inputs - For process instrumentation, such as levels, flowmeters, pressure, and analytical instrumentation (chlorine residual, pH, etc.), remove one wire of the analog circuit at the field device and use a DMM to source the 0, 25, 50, 75, and 100 percent spans indicative of the connected field device. Use controls integral to the field device to evoke the 0, 25, 50, 75 and 100 percent spans for the device. In all cases where the process instrument affords such functionality, use the field device's internal signal simulations to evoke the 0, 25, 50, 75, and 100 percent spans. Verify signal values in the PLC program. Verify signals read positive process values, i.e. verify polarity of signal wires are correct.
 - d. Analog Outputs - Force an analog output from the PLC program and verify the field device responds as intended. Pumps shall run at the commanded speed, valve actuators and positioners shall modulate to the commanded position, etc. Test at 0, 25, 50, 75, and 100 percent spans.
 - e. Fieldbus Network - Configure all node addresses, field device settings, and fieldbus module settings as appropriate to achieve maximum bandwidth without communication errors. Configure the PLC program to communicate to all nodes and demonstrate monitoring and remote-manual control functionality. For process instrumentation and analytical instrumentation, such as gas detection networks, demonstrate monitoring and control of the signals listed on the I/O lists.
 - f. Ethernet Network - Configure all IP addresses and field device settings, including how the device responds to a loss of signal/communications/network and loss of power. Configure the PLC program to communicate to all Ethernet devices and demonstrate monitoring and remote-manual control functionality.
- 8. RPR does not need to witness intermediate point-to-point testing. Upon completion of test, the Contractor shall provide the RPR with written certification that the test has been completed, and all I/O wiring has been verified as being correct. A copy of the completed checklist shall be submitted to the RPR for review and approval prior to scheduling final point-to-point testing.
 - 9. Signals that do not function as specified shall be examined and corrected prior to completion of intermediate point-to-point testing.
 - 10. Intermediate point-to-point testing shall not be considered complete until each signal has been successfully tested and items above are satisfied.
 - 11. Schedule - Upon RPR's acceptance that the intermediate point-to-point testing has been completed as specified, the CSI shall coordinate with the Owner and RPR to schedule the final point-to-point testing. Scheduling of the final point-to-point testing will not be approved prior to the RPR's acceptance that the Intermediate point-to-point testing has been completed as specified. Allocate a minimum of seven calendar days between RPR's acceptance of the Intermediate point-to-point testing documentation and the proposed start date of the final point-to-point testing period.

C. Final Point-To-Point Testing

1. Purpose

- a. To verify all signals, instruments, and equipment are functional and completely ready to be commissioned by the programmer.
- b. It is expected there are no issues during this testing and that the final point-to-point testing proceeds quickly without interruption.
- c. To assess percent complete on contractor payment applications.
- d. To document when the testing was performed and by whom the testing was performed and witnessed.
- e. Successful demonstration thereof shall be a prerequisite for substantial completion for any single system.

2. Scope of Testing

- a. All signals specified in the I/O lists.
- b. All signals added during the shop drawing and/or construction phases
- c. All fieldbus and Ethernet networks
- d. All signals tested during intermediate point-to-point testing

3. Prerequisites to commencing final point-to-point testing:

- a. Intermediate point-to-point testing has been successfully complete, documented, and documentation reviewed and approved by the RPR.
- b. All checklists shall be prepopulated by the CSI and their completed form submitted to the RPR for review and approval.
- c. Testing dates and planned sequence of testing has been submitted to RPR for review, approval, and scheduling.
- d. Appropriate equipment vendors, CSI staff, and operations staff are advised and properly coordinated to signals to be demonstrated.

4. Testing Documentation

- a. The CSI shall populate the Testing & Validation worksheet of the EQ Inventory, Configuration, and Validation workbook with all signals to be tested.
- b. Update the workbook to identify any testing methods that are not pertinent to the signal as N/A (i.e., Not Applicable).
- c. Perform testing of each individual signal in the presence of the RPR, unless the Engineer has waived all or a portion of this requirement in writing.

- d. Complete all testing of each signal and identify the person(s) performing the test. Obtain the signature of the RPR for each signal tested.
- 5. CSI shall expend all necessary labor required to demonstrate all signals.
- 6. Removal of a wire from a termination point within a previously tested circuit nullifies any previous testing of the circuit and necessitates retesting of the circuit following the complete point-to-point testing requirements in its entirety.
- 7. Method of Testing - To be performed as required by the intermediate point-to-point method of testing.
- 8. Final point-to-point testing shall not be considered complete until each signal has been successfully tested and items above are satisfied.

3.04. PCS PLC TEST PROGRAMS

- A. Develop and provide test programs for the PLCs, and network devices internal to the PLC enclosure, as required to demonstrate functionality of the system hardware components and communications through the system networks.
- B. Test programs shall provide for the following tests:
 - 1. Factory Acceptance Testing of PLC Cabinets
 - a. Demonstrate system-wide communications between network components.
 - b. Validate control panel wiring from each field wiring terminal block through the I/O modules and PLC.
 - 2. Field Testing of PCS - Validate field wiring to the PCS control panel from each field device (source) through the I/O modules, PLC, OIT. This shall be included for both the intermediate point-to-point wiring verification and final point-to-point wiring and transmission verification testing phases.

3.05. FIELD QUALITY CONTROL

- A. Installation
 - 1. The CSI shall provide on-site supervision and advice to the installing contractor to ensure the equipment is installed in accordance with the specifications and the manufacturer's requirements.
 - 2. Control Wiring - Contractor shall include time to install/replace/provide additional control and interlock components and wiring for each starter assembly or control panel as directed by the Engineer in the field. Modifications shall be performed as required to provide electrical interlocks and interface wiring to obtain a complete and operating control system.
 - 3. CSI shall have two field technicians made available during the testing of equipment to assist with performing wiring and control modifications as required to interface with other field mounted equipment and control panels as directed by the Engineer.

B. Inspections and Field Calibrations

1. Any and all testing equipment required for this project shall be owned by the CSI so as to be immediately available for this project.
2. The use of specific equipment manufacturer's startup, calibration, and troubleshooting personnel to assist the CSI shall be provided.
3. Calibrate instrumentation and place each system into operation. The commissioning of each system shall include the overall calibration and tuning of all control loops and sequences to provide stable control of the process. The validity of all process inputs and outputs for each system shall be checked and corrected during the system commissioning. Final adjustment and calibration shall be performed for all equipment prior to initiation of final testing.

C. System Testing

1. Testing of each panel and/or system shall be scheduled, performed in an orderly sequence, and conducted in the presence of, and to the satisfaction of the Engineer. Testing shall be conducted for each component and system in accordance with the CSI's submitted plan that has been reviewed by the Engineer.
2. Testing shall include the operation of all hardware, software, and custom control features.
3. Testing requirements described herein shall be performed as specified in the following sections:
 - a. Section 17000, Instrumentation
 - b. Section 17100, Programmable Logic Controllers
 - c. Section 01660, Testing and Startup.
4. The following field tests and demonstrations shall be performed for each of the panels:
 - a. Intermediate point-to-point wiring verification.
 - b. Final point-to-point wiring and transmission verification.
 - c. Network communications testing and verification.
 - d. Section 01660, Testing and Startup.

D. Field Testing Requirements

1. Demonstrate the control features of each panel and associated field mounted instrumentation and control equipment, to verify that each panel performs the required control functions and logic as shown on the Contract Drawings or as specified. Control features shall include relay energization, initiation of alarm conditions, resets, interlocks, set point activation, and other functions of the control panels.

2. Equipment shall be field demonstrated to operate satisfactorily in the presence of the Owner, and shall be conducted in accordance with the CSI's testing and demonstration plan that has been reviewed by the Engineer. Field demonstrations shall be performed after successful installation, calibration and testing of each control panel.
 3. In addition to demonstrating the operation of standard control features, special control panel functions shall be demonstrated as specified for each panel as specified below.
 4. The Contractor shall provide the necessary test equipment, process media, materials, supplies, and qualified test personnel to perform the field demonstrations as specified herein.
 5. Field instrumentation control signals that are required to demonstrate the operation of associated control panels may be simulated upon approval of the Engineer.
 6. In the event of failure of the field demonstration, the Contractor shall perform the necessary corrections and re-demonstrate, at his own cost and expense, the equipment as directed by the Engineer.
 7. Demonstration requirements described herein shall be performed as specified in the following specification sections:
 - a. Section 17000, Instrumentation.
 - b. Section 17100, Programmable Logic Controller.
 - c. Section 01660, Testing and Startup.
- E. Sequence of Testing and Demonstration - The CSI shall perform testing and demonstration in the following sequence:
1. Factory Acceptance Testing - Specified in Section 17100.
 2. Instrumentation Calibration and Testing - Specified with the respective Division 17 sections.
 3. Instrumentation Demonstration - Specified with the respective Division 17 section.
 4. Network communications testing and verification.
 5. Intermediate point-to-point I/O wiring verification.
 6. Final Point-to-Point I/O Wiring and Transmission Verification - Specified in Section 17100.
 7. Section 01660.
- F. The CSI shall provide competent personnel to participate in the field testing as scheduled required below.
- G. The CSI shall provide competent personnel to participate in the testing and startup of the facility as scheduled below and as specified in Section 01660.

- H. The CSI shall provide competent personnel to participate in the I/O testing as scheduled below.
- I. The CSI shall provide competent personnel to participate in startup and validation. This effort includes, but is not limited to, addressing how instrumentation was setup, terminations made, and identifying and investigating possible issues with wiring and equipment.
 - 1. The CSI shall respond immediately upon notification of an urgent matter, which may result in destruction or damage of a building, piece of equipment, or property.
 - 2. The CSI shall respond within 24 hours to all other matters.

3.06. CSI FIELD TECHNICIAN TABLE

Description	Number of CSI Field Technicians Required
Factory Acceptance Testing	2
Equipment Installation	2
Instrumentation Calibration and Testing	1
Instrumentation Demonstration	1
Network Communications Testing and Verification	2
Intermediate Point-to-Point Testing	2
Final Point-to-Point Testing	2
Programming Phase Services	2

END OF SECTION

SECTION 17100

PROGRAMMABLE LOGIC CONTROLLERS (PLC)

PART 1 GENERAL

1.01. GENERAL

- A. The Contractor shall furnish and install the following PLC enclosures, complete with all necessary accessories and PLC programming software, wired to accommodate all inputs and outputs listed in the input/output (I/O) lists, ready to communicate via the specified medium(s), and ready to be programmed by the Engineer. In short, this section includes:
1. Programmable logic controllers.
 2. PLC power equipment and accessories.
 3. Uninterruptible power supplies (UPS).
 4. Surge suppression.
 5. DC power supplies.
 6. PLC enclosures.
 7. PLC communication architecture.
 8. PLC I/O lists.
 9. Ethernet switches and firewalls.

1.02. GENERAL REQUIREMENTS

- A. It is a requirement of this specification that all Division 17 specifications be provided by a single supplier. This supplier shall have total responsibility for the entire system performance and compatibility of this Section, as well as all other Division 17 specifications.
- B. For ease of identification, symbols for the various components of the metering system to be furnished and installed are given in Table 17100-1.

TABLE 17100-1

SCHEDULE OF TYPE I PROGRAMMABLE LOGIC CONTROLLERS

PLC Nameplate Designation	Nameplate Designation	Location
North Broadway Pumping Station PLC	PLC-NB	North Broadway Pumping Station

1.03. RELATED SECTIONS

The specifications sections listed below are an integral part of this equipment specification and the Contractor shall be responsible for providing these sections to the equipment suppliers:

- A. Section 16055 – ELECTRICAL WORK
- B. Section 16161 - CONTROL PANELS AND ENCLOSURES
- C. Section 16484 - CONTACTORS AND MOTOR STARTING EQUIPMENT
- D. Section 16900 - AUXILIARY CONTROLS AND RELAYS
- E. All Division 17 specifications.

1.04. REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 3 - Industrial Systems.
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- D. NFPA 70 - National Electrical Code.
- E. NFPA 79 - Labeling.
- F. Instrumentation Society of America (ISA) - Standards 5.1 and 5.4.
- G. Industry Electric Code (IEC) – Article 1131.3, Programming Standards.
- H. Federal Communication Commission (FCC), Part 15.247.
- I. Underwriters Laboratories (UL) 508.

1.05. DEFINITIONS

- A. System Supplier – The party responsible for all of Division 17 specifications.
- B. UPS – Uninterruptible power supply.
- C. SCADA Node – A computer with an operating system (OS) that facilitates user interaction with supervisory software as well as other software programs that enable the user to manipulate data and generate reports. SCADA nodes are integral to the PLC network.
- D. FCC – Federal Communications Commission.
- E. Industrial Workstation – An HMI with an OS that typically serves as a node on a network and is typically a client node. Industrial workstations are panel-mounted and specifically suited for an industrial environment, otherwise they are identical to “Personal Computers” (PCs).
- F. I/O Lists – Table 17100-2.

1.06. SUBMITTALS

- A. Shop Drawings – Submit under provisions of Sections 01640 and 01300. The following submittal requirements are to complement the requirements and format set forth in Section 17000. The following submittal material shall be submitted for the Engineer’s review and approval prior to fabrication of any PLC enclosures. PLCs fabricated prior to the approval

of these shop drawings are subject to alteration to conform to the approved shop drawings by the supplier at the supplier's cost.

1. Submit samples for approval by the Engineer. The Engineer will retain samples. Submit samples as follows:
 - a. A 1-foot sample of a single 16-gage wire as used to wire discrete I/O within the PLC panel. Wire shall be labeled with the following text on the label:

Line 1: "YI-6789 to PLC-1"
Line 2: "123456789"
 - b. A 1-foot sample of a single 18-gage T.S.P. as used to wire analog I/O within the PLC panel. Wire shall be labeled with the following text on the label:

Line 1: "FI-6789 to PLC-1"
Line 2: "12345678"
 - c. A 1-foot sample of a single 18-gage T.S.P. as used to wire analog I/O inside the PLC panel. Wire shall utilize the heat shrink sheath proposed at each termination of such cable.
 - d. One terminal block with labeling in place.
 - e. One machine engraved nameplate used for labeling the PLC enclosure and subpanel devices with text as follows:

Line 1: "North Broadway"
Line 2: "Pumping Station"
Line 3: "PLC-NB"
2. Using AutoCAD 2014, or higher, provide these drawings for each PLC in the following order. Label all components with manufacturer and complete model numbers on the drawings. Typical drawings are not acceptable.
 - a. Scaled enclosure layout drawings in 11-inch by 17-inch format, detailing locations of all components on the subpanel, door, and all other enclosure faces. Label each view as "Enclosure Door", "Enclosure Subpanel", "Enclosure Side", etc. Drawing shall display layout of completed assemblies, including, but not limited to, PLC backplane, PLC I/O modules, empty slots, UPS, Ethernet switches, autodialers, terminal blocks, installed spare equipment, power supplies, power line isolators, surge suppression, grounding lugs, wireway, disconnect switches, fuses, control relays, acceptable regions for conduit penetrations of both AC and DC wiring separately, and external power. Illustrate handles, hasps, hinges, and dimensions of exterior mounted devices. Identify equipment manufacturer and model numbers by placing a number next to the piece of equipment on the drawing and cross-referencing with the Bill of Materials. In addition to the Bill of Materials cross-reference labeling, label PLC I/O modules on the drawing with the manufacturers complete model numbers.
 - b. Elementary diagram drawings in 11-inch by 17-inch format, detailing all enclosure electrical components including, but not limited to, power line isolators, surge suppression, UPS, power supplies, fuses, duplex receptacles, indicating lights, switches, and control relays. Diagrams shall

include terminal point designations, line reference numbers, and wire numbers. All wires shall maintain the same wire number for the entire contiguous segment of wire. Diagrams shall illustrate all network cabling and DC and AC electrical distribution. Drawing shall illustrate all available instrument terminations, both used and unused, and be labeled with the manufacturer's terminal point label as will be found on the installed instrument. Provide a legend on this sheet for all symbols and general notes used on this sheet and on the PLC I/O module detail drawings.

- c. Scaled PLC I/O module detail drawings, in 11-inch by 17-inch format, for each card installed in the PLC backplane. Detail the wiring of all terminations on the PLC I/O module including, wiring of all I/O points and power. Illustrate all terminations points for each signal including termination points for terminal blocks, relays, etc. Identify each wires color and wire number. Utilize NFPA 79 standards to illustrate termination points: to an MCC, to a device terminal, to a control panel terminal, to fused blocks, to surge suppressor blocks, etc. Label the each point on PLC I/O modules with the PLCs physical address. Utilize NFPA 79 standards for illustration of wiring: internal to the PLC enclosure, outside the PLC panel, and integral to a device. Progression of I/O modules detail drawings shall be in the order of the orientation of the I/O modules in the PLC backplane (e.g. Slots 1 and 2 on sheet 7, Slots 3 and 4 on sheet 8, etc.). Not more than two card details shall be shown on any one drawing. Each I/O module shall be labeled with the installed rack and slot number. Illustrate installed spare I/O modules, but it is not necessary to detail slot filler cards. Each drawing title shall have the following format:

Line 1: PLC Name (e.g. "Blower Building, PLC-3")
Line 2: Module Type (e.g. "Discrete Inputs", "Combo Module: AI, AO, DI, DO", etc)
Line 3: Installed Rack and Slot (e.g. "Rack 1, Slots 3 and 4")

Label all PLC I/O module termination points an I/O point description as shown on the PLC I/O lists. For I/O list points that lack certain information, create descriptions that are in accordance with ISA Standard 5.1. Each point description shall utilize the following format:

Line 1: Equipment Description (e.g. "RWP-1", "NaOCl Pump No.1", "Clearwell Level Transmitter", etc)
Line 2: Signal Description (e.g. "Run Indication", "Flow Indication", etc)
Line 3: Signal Functional Designation (e.g. "YI-XXXX", "FI-XXXX", where "XXXX" is the instrument loop number.)

- d. Include one AutoCAD drawing of the SCADA system network architecture. Detail all Ethernet switches, Category 5 cabling, SCADA nodes, modems, PC Ethernet cards, PLC CPUs, and all other details required to illustrate to the Engineer that the Contractor is proposing a communication network that meets the requirements of the completed system as specified in the Division 17 specifications and on the Contract Drawings. Illustrate location of the detailed equipment in the appropriate buildings and rooms. Label all communication cabling and connector types. Illustrate all communication ports of the equipment as they will be found in the field, including spare and unused ports. Illustrate all DIP-switch and jumper settings.
- e. Provide two copies of all the above specified AutoCAD *.dwg files on CD-ROM. Drawing files must be capable of being used by others and saved to the disk in *.dwg format.

3. Submit manufacturer information on all software.
 4. Calculations to substantiate sizing of each UPS. For each UPS, itemize all equipment drawing from the UPS and compare the respective current and power draws and to the manufacturer's rating of current draw for the specified amount of time.
 5. Unless the manufacturer is specifically named in these specifications, the following must be provided along with the manufacturer information for the proposed "or equals". Provide the following information for a minimum of 20 references for the Engineer to verify 7 of these installations: name and address of the client and location of installation, if different; name of the person in direct responsible charge; consulting design engineer; system programmer; details of the equipment; installation date; startup date; and full performance details. It is the sole responsibility of the Contractor to provide this information. Include all travel costs for Engineer to visit two of the referenced installations.
- B. Operation and Maintenance Manual – Submit under provisions of Sections 01640 and 01300. The following submittal requirements are to complement the requirements and format set forth in Section 17000. Substantial completion for this section will not be approved until the Engineer has approved Operation and Maintenance manuals.
1. Maintenance, troubleshooting, and replacement of PLC cards, racks, CPU, EEPROM, and all associated equipment.
 2. All "as built" AutoCAD *.dwg files on CD ROM and 11-inch by 17-inch printed hardcopies.
 3. Warranties – Provide the warranties for the PLC, cards, programming software, operator interface, and all other PLC enclosure equipment in a section entitled "Warranties." Equipment covered, dates of expiration, contacts and procedures to exercise each warranty, and limitations of warranty shall be explicitly noted. All warranty papers shall be completely filled out by the Contractor with all necessary serial and model numbers.
 4. One manufacturer-supplied programming manual for the supplied PLC(s).
- C. Project Record Documents – Submit under provisions of Sections 01640 and 01300. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
1. Revise AutoCAD drawings of individual I/O cards to reflect all scaling. Coordinate with the PLC programmer for each points scaling.
 2. Update the Operation and Maintenance Manual AutoCAD, or higher, drawing hardcopies and CD-ROM with the "as built" drawings.
 3. Updated AutoCAD drawings to indicate any changes made during installation or startup of the equipment provided under this section.
 4. Updated Bill of Materials reflecting any changes in manufacturers, models, or quantities.
 5. Updated Bill of Materials for spare parts supplied.

1.07. QUALIFICATIONS

- A. System Supplier – Company specializing in the fabrication of control panels incorporating PLCs.

- 1. System supplier shall be the CSI.

1.08. DELIVERY, STORAGE, AND HANDLING

- A. Finished PLC panels shall be shipped from the CSI's facility to the project site for programming. Contractor is responsible for all costs associated with shipping. All PLC panels shall be shipped to the project site for programming fully assembled, wired, and tested and accompanied by a complete and accurate set of Engineer-approved PLC wiring diagrams.

- B. Deliver, store, protect, and handle products to the site under provisions of Sections 01600, 01640, and 16055.

- 1. Shipping to all locations for all equipment provided under this section shall utilize accelerometer or 3-axis dye packets to indicate whether acceleration or deceleration of three times the force of gravity (3G) has been exceeded. If acceleration/ deceleration has been exceeded, Contractor shall pay for disassembly, damage repair, and reassembly of the shipped units. If any damage is apparent from inspection at time of delivery, Contractor is responsible for all costs involved in disassembly, damage repair, reassembly, and additional shipping back to the manufacturer's facility if deemed necessary by Engineer. Accelerometers shall be dye packet devices and shall not be reusable or resettable.

- C. Accept products on site in factory containers unless systems are completely integrated into a pre-manufactured panel that has been factory tested. Inspect for damage.

- D. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

- E. Contractor shall provide risk/hazard insurance for property of Owner/Engineer/Contractor for all equipment provided under this section.

- 1. Insurance shall be in accordance with Supplementary Conditions, Article 5.

- 2. Submit proof of insurance prior to shipping PLCs.

- F. Programmer's Visit - Upon completion of shop testing at the system integrator's facility, contact the Engineer to schedule a three-day visit by the PLC programmer to the System Integrator's facility to install all PLC programs, and tune PLC program. This testing date shall be a minimum of 45 days after the Engineer's shop drawing approval and a minimum of 5 days after approved shop test results. Systems integrator shall make the following provisions in advance of the PLC programmer's visit:

- 1. Appropriate power to PLC panels.
 - 2. Clean working surface for the PLC programmer's laptop computer.
 - 3. Preterminated PLC cables.
 - 4. PLC programming software, if not already submitted with the shop drawings, as specified.

5. All UPSs and battery backup units shall be installed and functional.
 6. All wiring and terminal blocks shall be labeled.
 7. An electrician on staff to make any necessary wiring changes to achieve specified function should PLC programmer identify non-functional or unacceptable wiring.
 8. Testing area shall be in a climate-controlled room.
- G. Scheduling Delivery of PLCs to Engineer – Engineering charges for delaying panel fabrication and delivery of PLCs shall be assessed in accordance with Article 4.03 of the Agreement.
1. PLC-NB shall be delivered to the Engineer by the Contractor for programming a minimum of 14 days prior to the startup of the UV system.
 2. Other PLC requirements.
 3. Programming by the Engineer is estimated to take approximately 14 days upon successful completion and demonstration of final point-to-point testing.
 4. UPSs associated with the PLCs shall be delivered to the project site within two weeks prior to shipment of the PLCs to site.
- H. Contractor is responsible for all costs associated with shipping.
- I. Contractor is responsible for preparing the assembled PLCs and associated equipment for shipping and shipping them to the project site.
- J. Accept products on site in factory containers unless system is completely integrated into a pre-manufactured panel that has been factory tested. Inspect for damage.
- K. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

1.09. MAINTENANCE SERVICE

- A. PLC Equipment Replacement During Construction – Contractor shall replace PLC components when directed to do so by the programmer. Contractor shall provide all costs necessary to return components that are suspect of damage to the manufacturer for testing and are responsible for returning repaired modules and reinstalling in place of the temporary replacement module. When available, temporary replacement modules may be taken from uninstalled spare inventory. When the required temporary replacement modules are not available in the uninstalled spare inventory, Contractor shall obtain the necessary temporary replacement module(s) within 48 hours of directive by the programmer.

1.10. COORDINATION

- A. Coordinate the compatibility of the power supplies and PLC cards with the new instrumentation, existing systems, and equipment. Coordination shall include, but not be limited to:
1. Power supplies provide powered equipment with adequate voltage and amperage according to the connecting equipment manufacturer's recommendations.
- B. Refer to Contract Drawings for designations and verify with Owner.

- C. Coordinate PLC panel shop testing demonstration with the Owner and Engineer. Request for demonstration date shall be in writing no less than two weeks in advance of the proposed date.

1.11. EXTRA MATERIALS

- A. One licensed copy of Windows-based on-line and off-line programming software (development) used by the system integrator for programming the PLCs contained within this contract. PLC programming software provided to the Owner shall be the latest version at the time of system Substantial Completion. Software shall be IEC 1131-3 compliant and include both ladder logic and Function Block Diagram editors. One-year technical support contract with the software manufacturer. Software shall be supplied to the Engineer with the first revision of the PLC shop drawings.
- B. Cable, software drivers, network cards, and other devices as required by PLC manufacturer to communicate from the PCI slots of each computer with the communication ports of PLCs provided by the system integrator.
- C. Cable, software drivers, and other devices as required by setpoint station manufacturer to communicate from the serial port of a PC-compatible computer with the programming ports of setpoint stations provided by the system integrator of this project.

1.12. SPARE PARTS

- A. Provide the following uninstalled spare parts that are identical to and interchangeable with the original parts. Spare parts shall be furnished in clearly identified containers, protected in accordance with the manufacturer's requirements.
 - 1. One (1) spare CPU for each CPU type.
 - 2. One (1) spare memory battery for each PLC.
 - 3. One (1) spare PLC power supply of each type used.
 - 4. One (1) nonvolatile memory module with final, debugged program stored on it for each PLC (EEPROM, CF Card, as appropriate).
 - 5. Two (2) of each type discrete input module.
 - 6. Two (2) of each type discrete output module.
 - 7. Two (2) of each type analog input module.
 - 8. Two (2) of each type analog output module.
 - 9. Two (2) of each type cable used to connect PLC I/O racks.
 - 10. Two (2) spare 24 VDC power supply of each type used.
 - 11. One (1) Transient Voltage Surge Suppression (TVSS) device as used to protect the incoming power to the PLC panel.
 - 12. Five (5) of each type surge suppression device as used to protect incoming analog signals.

13. Five (5) of each type surge suppression device as used to protect incoming discrete signals.
14. Ten (10) spare bulbs for each type of light.
15. Twenty (20) spare fuses of each type used for each control panel. Each control panel shall receive 20 spare fuses for each type used. Provide fuses in labeled containers and mount in each control panel.

PART 2 PRODUCTS

2.01. PLC MANUFACTURERS

A. For PLCs listed in Table 17100-1, provide the following type of PLCs or equal:

1. Allen-Bradley, Model CompactLogix, or higher.
2. Modicon, Model M340, or higher.

2.02. PROGRAMMABLE LOGIC CONTROLLER

A. General Description

1. Programmable controller manufactured to NEMA ICS 3 with component circuit boards manufactured to NEMA ICS 2.
2. Rack-mounted design. Modular.
3. Provide all terminal blocks, wiring arms.
4. Ability to program through an IBM compatible computer.
5. Provide all power supplies, cabling, surge protection, I/O racks, extensions, and ladder logic program to accommodate required I/O and system control as specified in previous sections.
6. Programmable with software by the same manufacturer in strict accordance with IEC 1131-3 standards.

B. Configuration

1. Processor Unit - Include processor, power supply, EEPROM memory, input/output modules, and special modules required to communicate with other PLCs and other equipment designated to communicate digitally with the PLCs.
2. PLC Module Capacity(for PLCs listed in Table 17100-1)
 - a. Backplanes or I/O racks shall have a minimum of 10 slots and the capability to support any I/O configuration utilizing all slots.
 - b. Provide a minimum of five spare slots.
 - c. Provide covers for empty slots.

C. Table 17100-1 PLC CPUs

1. Memory Size - Minimum 4MB of logic memory, minimum.
2. Processing Speed – Final program scan time shall not exceed 5 milliseconds in any one PLC. In PLCs where the scan time exceeds this requirement, the CPU shall be replaced with a larger CPU at no additional cost to the Owner.
3. Reserve Memory – Final program shall not exceed 65 percent of the available CPU program capacity. In PLCs where the program occupies more than this amount, the CPU shall be replaced with a larger CPU at no additional cost to the Owner.
4. CPU microprocessor shall be by Intel, AMD, or Motorola.
5. Each CPU shall be able to address a minimum of 2048 I/O points. Provide quantities of CPUs as recommended by the manufacturer for the quantities of I/O points for each PLC provided.
6. CPU shall have a minimum of one communication port for Modbus Plus or DH+ and one serial communication ports for programming and interface with setpoint stations. Minimum speed of the serial communication ports shall be 19,200 BPS.
7. Provide communication adapter modules as necessary to communicate with telephone modems, IPCIs, and other equipment as necessary to achieve specified system architecture.
8. Provide Time of Day (TOD) clock option adapters.

D. Input/Output Units

1. PLC
 - a. All I/O modules for PLCs shall be of the same form-factor as the PLC CPU and shall plug into the PLC backplane (rack).
 - b. Use discrete I/O modules with a minimum of 8 and a maximum of 16 points each, 24VDC or 120VAC as required by I/O lists. Discrete outputs shall be isolated. All discrete input modules shall have the same number of points. All discrete output modules shall have the same number of points.
 - c. Use analog I/O cards with a maximum of eight channels per card. Use voltage, current, or other analog arrangements as required by I/O lists. Analog I/O shall have minimum 12-bit resolution. All analog inputs and outputs shall be isolated. All analog modules shall have the same number of points.
 - d. Combination I/O modules are not acceptable.
2. Installed Spare I/O - Provide the following installed spare I/O:
 - a. Provide a minimum of eight discrete inputs at each PLC.
 - b. Provide a minimum of eight discrete outputs at each PLC.
 - c. Provide a minimum of four analog inputs at each PLC.

- d. Provide a minimum of four analog outputs at each PLC.
 - e. Wire all installed spare points to terminal strips. These terminal blocks do not count toward installed spare terminal blocks.
 - f. Discrete outputs shall be isolated using an interposing relay. Provide relays for used and installed spare discrete outputs.
 - g. In PLC enclosures where signal isolators are used to isolate analog inputs or analog outputs, provide signal isolators for each installed spare analog I/O point.
3. Refer to I/O list for I/O points for each PLC enclosure.
- a. All I/O shall be wired to terminal strips. Where relays, intrinsically safe barriers and/or surge protection for I/O are required, wiring shall be from the I/O module to the relay, barrier, or surge protector to the terminal strip.
 - b. Provide intrinsically safe barriers for I/O originating in hazardous areas as indicated on the Contract Drawings. Installation and separation of wiring shall be in full accordance with the latest revision of the NEC.
 - c. Provide surge protection in accordance with Section 17000. Surge protection shall be located on a separate DIN rail from the terminal strips.
 - d. Provide loop and external power supplies for all field devices that require such power.
 - e. Provide 120 VAC power for all 120 VAC discrete outputs.
 - f. Provide 24 VDC power for all discrete inputs.

2.03. STRATEGIC WIRING OF I/O

- A. Wiring of I/O shall be planned such that the failure of any single PLC I/O module minimally affects an overall process. The following guidelines shall be adhered to:
 - 1. Control outputs for multiple pumps of similar purpose shall be distributed across separate PLC output modules.
 - 2. Where redundant monitoring is designed, such as redundant level transmitters, the signals shall be located on separate I/O modules.
 - 3. For system components that are distributed across multiple modules, the wiring location on the PLC I/O module shall be consistent for that signal across each of the I/O modules over which similar equipment is distributed. To illustrate, if Pump 1's run indication is wired to Input 1 on module 5, then Pump 2 and Pump 3's run indication shall also be wired to Input 1 on their respective input modules.
 - 4. It is understood that the above strategic I/O wiring requirements will result in the use of additional modules with installed spares that are not necessarily in contiguous ranges.
 - 5. Relocate I/O points as directed by the Engineer through the shop drawing reviews.

2.04. ENCLOSURE

- A. All PLC enclosures shall be appropriately sized to accommodate all I/O modules, power supplies, communication equipment, etc. as specified within this section and as necessary to perform the required functions.
- B. Provide PLC at PLC-NB in the following enclosures:
 - 1. Free-standing, two-door, NEMA 12 enclosures.
 - 2. Reserve space within the enclosure for the future provision of one 10-slot rack.
- C. All other PLCs shall be installed in NEMA 12 enclosures sized as necessary. Reserve space within the enclosure for the future provision of a 10-slot rack and CPU.
- D. PLC enclosures and associated components shall be in full accordance with Section 16161.
- E. Maximum footprint for PLC enclosures shall be 24 inches by 60 inches or as otherwise shown on the Contract Drawings.
- F. Refer to Electrical Contract Drawings for locations and space available for PLCs.
- G. Each enclosure shall have two ground busses, one for instrumentation cable shields and enclosure grounding and one for signal grounding.
- H. Provide grounding lugs for connection to the external grounding system.
- I. Provide a Ground Fault Circuit Interrupter (GFCI), 15-amp duplex receptacle in each PLC enclosure. To be used as a service outlet with both outlets available.
- J. Provide three-point latching, gasketed, keyed locking handles. All PLC enclosures shall utilize the same cylinder lock and keys. Provide two keys per enclosure.
- K. Provide a fluorescent light package in each enclosure. Fluorescent light shall utilize a manual light switch, terminal block, and non-yellowing PVC lens. Light shall not energize automatically when door is opened. Light shall be Hoffman, Model A-LF16MXX, or equal.
- L. Terminal Blocks
 - 1. Terminal blocks shall be DIN-rail mounted compression-screw type.
 - 2. Label via machine printed zack strips as supplied by the terminal block manufacturer. Zack strips shall be plastic labels specifically designed for the supplied terminal block. Zack strips shall be capable of being separated to label stand-alone terminal block, if necessary.
 - 3. Screwless terminal blocks are not acceptable.
 - 4. Provide installed spare terminal blocks to accommodate wiring of PLC I/O modules provided in empty slots. Of the remaining empty slots, estimate half will be 8-point analog cards and half will be 16-point discrete cards. Mount installed spare terminal blocks in a contiguous strip next to the utilized discrete input, output, analog input, or output strips.

5. For discrete I/O, utilize single tier terminal blocks (Phoenix Contact, Model UK 5N, or equal). For analog I/O, utilize double tier terminal blocks with grounding foot (Phoenix Contact, Model SLKK 5, or equal).

M. Fuse Blocks

1. Provide individual fuses for each PLC module.
2. Fuse blocks shall utilize slow or fast blow glass fuses as appropriate for the protected device.
3. Fuse block shall have an LED that illuminates when the fuse has blown.
4. Label via machine printed zack strips as supplied by the fuse block manufacturer. Zack strips shall be plastic labels specifically designed for the supplied fuse block. Zack strips shall be capable of being separated to label stand-alone fuse block, if necessary
5. Provide installed spare fuse blocks to accommodate wiring of additional PLC I/O modules. Estimate as is done for terminal blocks.
6. Fuse block manufacturer shall be Phoenix Contact, Model UK5-HESI, or equal.

N. Relays

1. Provide relays for all discrete outputs.
2. Characteristics - Plug-in, spade terminal style with pilot light and retainer clip. All relays shall be DPDT rated 10A, minimum. DIN-rail mount relays.
3. Manufacturer shall be Square D, type KU, or equal.

O. Wireway

1. Provide covers for all wireway.
2. For all stand-alone enclosures, provide 3-inch width wireway, minimum.
3. Size width and depth based on 50 percent of area fill. Check the applicable codes to verify fill.

P. Hand Off Auto (HOA) Selector Switches - Provide HOA selector switches on the front of the enclosure for each booster pump to maintain control of the pumps operations in place per Section 16900.

Q. Enclosure Nameplates – Provide the following machine engraved nameplates permanently affixed to the front door of each PLC enclosure:

1. Short Circuit Current Rating (SCCR) – Calculate and display SCCR per UL508A Supplement SB. Contractor shall establish the SCCR of individual, relevant power circuit components; apply current limiting components to modify the SCCR in a portion of a circuit in the panel; and determine the overall SCCR of the panel. Submit itemized SCCR calculations with PLC shop drawings. On the nameplate, identify:
 - a. The panel builder company name and address.

- b. Main supply voltage, phase, and frequency.
 - c. Electrical power full load current, largest motor FLA, and SCCR.
 - d. Enclosure type rating.
 - e. The lighting panel name (i.e., LP-1) and circuit breaker position (i.e., CB-15).
- 2. Enclosure Nameplate – Nameplate as required by Table 17100-1.
- R. Install a laminated plastic card in the enclosure of each PLC provided under this Contract detailing all procedures for restarting the PLC upon lockup, including reloading the PLC program when necessary.
- S. Install pertinent final I/O lists, elementary diagrams, and PLC card wiring diagrams in the enclosure of each PLC provided under this contract. Drawings shall be laminated and bound via a plastic zip strip through a metallic grommet in the upper left-hand corner of each drawing.

2.05. PLC HIGH-SPEED PEER-TO-PEER COMMUNICATION SYSTEMS (PLC NETWORK)

- A. General
 - 1. Communication shall be through Ethernet.
 - 2. Minimum data communication speed shall be 10 Megabits per second (MBPS).
 - 3. PLC network topology shall be as shown on the Contract Drawings.
 - 4. PLC-NB shall communicate peer-to-peer with the UV system PLC. It is preferred that both PLCs are the same manufacturer; however if they are not, a Red Lion Data Station DSPLE shall be provided herein.

2.06. PLC ACCESSORIES

- A. 24 VDC Power Supply
 - 1. Provide 100 percent redundant power supplies that supply a sufficient quantity of 24 VDC power as necessary to power PLC equipment and instrumentation connected to the PLC.
 - 2. Power supplies shall be manufactured by Phoenix Contact, Model QUINT Series, PLILS, Allen-Bradley, or equal. Power supplies shall meet, or exceed, the following requirements.
 - a. UL 508 listed, CE approved.
 - b. DIN-rail mounted.
 - c. Removable, pluggable connections for input and output power.
 - d. Local output status indication light.
 - e. Overload Protection - Current limited to a preset value.

- f. 86 percent efficient.
 - g. Output Voltage - 24 VDC +5 percent adjustable.
 - h. Temperature Range - -20 to 50 degrees C.
 - i. Mean lifetime of 500,000 hours.
 - j. Two-year warranty.
 - k. Ripple and Noise - 24 mV RMS, 200-mV peak to peak.
 - l. Accept input voltages of both 120 VAC and 240 VAC.
 - m. Fully enclosed, touch-safe.
3. Redundancy - Power supply redundancy shall be facilitated via a manufactured supplied redundancy module. Custom solutions are not acceptable. Redundancy module shall remove all loads from the power supply until a failure occurs.

B. I/O Signal Surge Suppressors

- 1. Provide I/O surge suppression for all discrete and analog signals terminating or originating out of doors or in other buildings and as specified in Section 17000.
- 2. PLC TVSS – Metal Oxide Varistor (MOV) based surge suppression with an active tracking filter.
 - a. Provide one power protection device for each PLC enclosure.
 - b. Manufacturer – Emerson Network Power, Model Islatrol IE; or equal.
 - c. Minimum of 160 Joules protection between line-neutral, line-ground, and neutral-ground for a total of 480 Joules protection.
 - d. Response Time – Less than 1 nanosecond (in Normal mode).
 - e. 40kOhm surge capability on a 8x20 microsecond waveform.
 - f. UL1449 listed for safety and performance.
 - g. Manufactured by an ISO 9001 company.
 - h. Load side sine wave tracking circuitry.
 - i. Arrays of MOVs shall be located directly on the load side terminals and line side terminals to minimize response time.
 - j. Enclosure – Sand packed or epoxy filled.

C. Analog Signal Splitter

- 1. Provide two analog signal splitters for splitting the signals as indicated on the Contract Drawings.

- a. UL 508 listed, CE approved.
 - b. Ambient temperature range shall be -20 degrees C to 65 degrees C.
 - c. The power supplied to the unit shall be 24 VDC.
 - d. LED indicator light.
2. Manufacturer – Phoenix Contact Model MCR, AGM DIN4000-5 or equal.

2.07. UNINTERRUPTIBLE POWER SUPPLY (UPS)

A. Characteristics

1. Provide one Online Double Conversion UPS for each PLC. Line Interactive, Offline-Standby, Double Conversion On Demand, and Ferro-resonant technologies are not acceptable.
2. Minimum Watt Capacity - See paragraph 2.07.C below.
3. Minimum Volt-ampere Capacity - See paragraph 2.07.C below.
4. Four 120-volt, 5-15R, output receptacles, minimum.
5. Alarms - Battery backup operation, low run time remaining, and overload.
6. Automatic current and over-voltage output protection.
7. Operating Input Voltage - 99 VAC - 138 VAC.
8. No interruption (no transfer time for normal power to battery backup) of power to the PLC system.
9. Efficiency - 95 percent.
10. Brownout protection for input voltages of 88 VAC without the use of the batteries.
11. Lightning and Surge Protection - ANSI/IEEE C62.41 Categories A and B with 0.3 to 0.7 percent.
12. Radio Frequency Noise Isolation - 38 dB common mode, 47 dB normal mode.
13. DIN-rRail mounted.
14. Power Reserve Time at Full Power Draw - One hour, minimum. See paragraph 2.7.C below for power draw requirements. CSI shall submit calculations to substantiate sizing.

B. Manufacturer –Phoenix Contact, Model Quint, or equal.

C. PLC power supply shall be backed up by the UPS. The required capacity of the UPS shall be determined by the load requirements of the PLC and its peripherals. As a minimum, the UPS shall maintain power to the entire panel, all communication devices and modules, all relays, all loop power supplies, all indicators, the PLC, and all PLC I/O that is powered from the panel, setpoint station, but not the heating/cooling system for the panel.

2.08. AUTODIALER

A. Characteristics

1. The dialer shall be a solid state device capable of dialing up to 16 telephone numbers, each number being up to 60 digits in length.
2. The dialer shall accommodate 16 discrete inputs.
3. The dialer shall have two different categories of speech message capability, all implemented with permanent non-volatile solid state circuitry with no mechanical mechanisms.
4. The dialer shall continuously monitor the presence of AC power and the status of four contact closure inputs. AC power failure or violation of the alarm criteria at any input shall cause the unit to go into alarm status and begin dial-outs.
5. Upon initiating an alarm call, the dialer is to "speak" only those channels which are currently in "alarm status". Inquiry phone calls can be made directly to the unit at any time, for a complete status report.
6. Alarms are acknowledged either by pressing a Touch Tone as the call is being received, or by calling the unit back after having received an alarm call.
7. The dialer is to use a standard "dial-up" telephone line (direct leased line is not required), and is to be FCC approved.
8. The dialer shall be covered by a five-year warranty covering parts and labor performed at the factory.

B. Manufacturer - RACO Model Verbatim or equal.

2.09. INTERNAL TEMPERATURE SENSOR

A. Characteristics

1. Provide one wall mount temperature sensor for each PLC enclosure. Provide all mounting, power supplies and cable needed to connect the sensor to an analog input card on the PLC.
2. The temperature range shall be 0 to 135 degrees F.
3. The output shall be 4-20 mA.
4. The input power shall be 24 VDC.

B. Manufacturer – OMEGA EWS-TX or equal.

PART 3 EXECUTION

3.01. EXAMINATION

- #### A.
1. Verify that surfaces are ready to receive work.

- B. Verify field measurements are as shown on Drawings.
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts conditions.
- E. Verify grounding of system.

3.02. PANEL FABRICATION

- A. Install in accordance with manufacturer's instructions.
- B. Wire Labeling
 - 1. All wiring shall be labeled within 1.0-inch of stripped sheathing.
 - 2. Wire label text shall be visible in its installed location without manual manipulation.
 - 3. Wire shall carry the same wire number for an entire contiguous segment.
 - 4. Wires shall be labeled via machine-generated print on polyester or polyvinyl film.
 - 5. In the event that labels begin to fall off or text begins to smudge, or otherwise begin to become illegible, within one year of panel delivery to the site, the Contractor shall remove all labels within the panel with new labels at the Contractor's own expense. In this case, the Engineer must approve replacement labels.
- C. Device Labeling - All subpanel-mounted devices shall be labeled.
 - 1. Devices that do not require external power (24 VDC or 120 VAC) shall be labeled via machine-generated print on polyester or polyvinyl film. Print shall not be capable of being washed off, smudged, or erased. Labeled components include, but are not limited to, individual terminal blocks, control relays, individual fuses, individual I/O surge suppressors, and grounding bars.
 - 2. Devices that require 24 VDC external power or 120 VAC shall be labeled via machine engraved plastic nameplates utilizing white text on black background. Nameplates shall be secured to the subpanel via permanent adhesives. Labeled components include, but are not limited to, disconnect switches, TVSS, power supplies, PLC backplanes, circuit breakers, DIN-rail strips, Ethernet switches, UPSs, and convenience receptacles.
 - 3. Exemptions – Individual PLC I/O modules only.
- D. Supplier-Fabricated Cabling – All cabling fabricated by the panel fabricator

3.03. SHOP TESTING

- A. To verify that all PLCs are ready for system programming, the system's integrator shall perform the following shop testing prior to shipment to the site:
 - 1. Perform a test configuration on all PLC modules to verify that all PLC CPUs communicate with the associated I/O modules, including inter-rack communication.

2. Perform a test configuration of all device servers to verify that the PLC communicates with a Modbus device connected to each device server.
 3. Install the battery backup, UPS, and power supplies, simulate all device outputs to the PLC, and verify that the signals are read properly at the PLC. As part of the testing of the UPS, fully charge the UPS battery and disconnect line power from the UPS and verify that:
 - a. "Power Loss" is sensed by the PLC when line power is disconnected.
 - b. Verify that when the UPS battery low that "Low UPS Battery" is sensed by the UPS.
 - c. Record the time it takes for the UPS battery to completely drain from full charge once line power is disconnected from the PLC panel.
 4. 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 the electrician will terminate field wiring to.
 5. Leave all configuration programs in the PLC CPU.
 6. Perform testing to verify that the Ethernet communication between the PLCs is in accordance with the manufacturer's requirements.
- B. After all testing has been successfully completed, contact the Engineer to schedule an in-shop inspection by the Engineer. Contractor shall have the personnel that performed the testing present to perform random verification of the tests performed by the integrator.
- C. Submit a written report to the Engineer prior to scheduling Engineer's in-shop inspection.
- D. The Contractor shall furnish all instruments and a qualified engineer to properly perform all tests required.

3.04. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. All electrical work performed in fabrication and installation of PLC systems shall be in full accordance with the requirements of the Division 16 Electrical Specifications.
- C. Autodialer
 1. Provide the required mounting hardware for the installation of the autodialer and install the autodialer in the PLC enclosure.
 2. Reserve channels 12-15 for alarm inputs from the UV OEM system.
 - a. Wire four discrete outputs from the UV system to channels 12-15.
 3. Wire a relay from PLC-NB to serve as an alarm for when the PLC fails. This should be a normally closed contact and installed in channel 16 of the Autodialer.

4. Coordinate in writing with the Owner and Engineer the plan to install the autodialer and wire the required equipment.
 5. Verify with the Owner and Engineer that the autodialer is set up properly and is fully functional.
 6. The Contractor is responsible for recording voice messages for when the dialer calls out. Rerecord voice messages as directed by the Owner and Engineer in the final punch list.
- D. Analog Signal Splitter - Sequence of installing the signal splitters.
1. Move the pulse duration receivers and associated signals to the PLC enclosure.
 2. Install the signal splitters and provide 24 VDC power to the splitters.
 3. Wire one of the analog outputs to the original input of the chart recorders and wire the second analog output back to the PLC.
- E. Pump Equipment
1. Designate one half of the PLC enclosure for PLC and associated equipment. Designate the other half of the PLC enclosure for use of pump equipment.
 2. Contractor is responsible for wiring starter, pump, relays, etc. from the original pump control panel, as shown on the Contract Drawings.
 3. Install HOA switches that are independent of the PLC so that if the PLC is off, the operation of the HOA switch is functional.

3.05. SYSTEM PROGRAMMING

- A. The programmer shall provide all system programming to implement system description. The programmer shall modify all programming to meet the requirements of the Owner.
- B. The programmer shall provide additional programming services as required by Owner if system needs modification to function properly.
- C. Programmer shall provide for programming of an additional 25 points of I/O. If these services are not used, a credit shall be provided to the Owner.
- D. The Contractor and programmer shall schedule system programming with the Owner. Upon request, the programmer shall visit the site within 24 hours of request.

3.06. MANUFACTURER'S OR SYSTEM INTEGRATOR'S FIELD SERVICES

- A. Provide a minimum of eight, eight-hour days of on-site time for supervision of installation and hardware troubleshooting at Engineer's request. The eight days of on-site time may be required over a span of one month. Written notification of the days required for troubleshooting and installation supervision will be sent to the Contractor 10 business days prior to the first required day.

3.07. DEMONSTRATION AND OPERATION

- A. Provide systems demonstration under provisions of Sections 01600 and 01640.

- B. Demonstrate operation and programming of controller.
- C. Demonstration shall include, but not be limited to, the following:
 - 1. Demonstrate all alarms.
 - 2. Demonstrate changing of all setpoints.
 - 3. Demonstrate actions upon alarm.
 - 4. Demonstrate actions upon power loss.
 - 5. Demonstrate all control logic.

3.08. TRAINING

- A. Provide two, four-hour sessions of training to the operations staff covering the following content:
 - 1. Reading PLC wiring diagrams. Using the Engineer reviewed and approved as-built set of the PLC wiring diagrams.
 - 2. Identification of each component within the PLC enclosure.
 - 3. Identify incoming sources of power and instruct on how to disconnect AC power, including bypassing and discharging the UPS.
 - 4. UPS Maintenance and Troubleshooting – Demonstrate UPS battery replacement, bypassing UPS, interpreting integral indicator lights, determining when UPS has primary power, when UPS is on battery, when the battery is low, and when the battery requires replacement. For UPSs with USB or Ethernet accessible web status pages, demonstrate how to get online with the UPS and assess status.
 - 5. DC Power Supply Troubleshooting – Describe methods to troubleshoot power supply operation, including measuring output voltage and comparing to required voltage. Define indicator light functions.
 - 6. Fusing – Describe purpose and function of fuses and circuit breakers. Identify the devices each fuse/CB protects and demonstrate how to identify a blown fuse both visually as well as with a DMM. Demonstrate fuse replacement and provide guidance on identifying required amp rating of each fuse per the as-builts.
 - 7. PLC CPU, Communication Modules, and I/O Modules – Identify each component and detail their purpose integrating as-builts into the training. Demonstrate how to ascertain when discrete signals are energized, when analog signals are open loop, and identifying indicator light functions.
 - 8. Module Replacement – Demonstrate proper PLC module troubleshooting and replacement procedure. Address the relationship between module fusing with module testing and distinguishing between a blow fuse, defective module, and defective field device or defective field wiring.
 - 9. CPU Replacement – Demonstrate proper PLC CPU replacement.

10. CPU Memory Battery Replacement – Demonstrate proper memory battery replacement. CPU shall not lose program through demonstration.
 11. Ethernet Switch Troubleshooting – Identify indicator lights and how to access Ethernet switch's web utility for troubleshooting. Identify indicator lights and, using the link and activity lights, instruct on how to identify a disconnected link and how activity lights display when properly functioning. Demonstrate Ethernet switch replacement.
 12. TVSS – Identify TVSS and demonstrate troubleshooting and replacement.
 13. Analog Signal Testing – Using a DMM, provide hands on demonstration on how to test an analog circuit for 4-20 mA current, including breaking the loop and inserting the DMM in series with the load.
 14. Discrete Signal Testing – Using a DMM, provide hands on demonstration on how to test a discrete circuit for continuity and voltage.
 15. Networking Equipment – Identify and explain purpose of all networking equipment within the PLC enclosure.
 16. Address additional questions by Owner to complete each training session.
- B. All procedures shall be as recommended by the respective equipment manufacturer.
 - C. Procedures shall be physically performed rather than discussed in theory.
 - D. Training shall be video recorded and submitted to the Engineer for review and approval.

3.09. CERTIFICATION OF TESTING

- A. Unless waived in writing by the Engineer, all tests shall be made in the presence of a duly authorized representative of the Owner. 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. All tests shall be performed in the presence of the Owner. Written notice of all tests shall be given the Owner at least two weeks in advance.

3.10. TEST EQUIPMENT

- A. The Contractor shall furnish all instruments and a qualified engineer to properly perform all tests required.

3.11. FACTORY-TRAINED SUPERVISION

- A. The Contractor shall include in his work the providing of 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. Point-to-point test of all wiring.
- C. Functional test of all equipment, modes, alarms, controls.

END OF SECTION

Item No.	Equipment Item	Equipment Designation	Description	Function Designation	Input or Output	I/O Type	Electrical Characteristic	In/Out Building?	Remarks
Chart Recorder Signals									
	Reservoir Tank Level	CR1-1	Level Indication	LI, LR	Input	Analog	4-20 mA	In	Existing. Signal to be relocated to CP.
	Pump Station Flow	CR1-2	Flow Indication	FI, FR	Input	Analog	4-20 mA	In	Existing. Signal to be relocated to CP.
	Pump Station Residual Chlorine	CR2-1	Chlorine Residual	AI, AAHH, AAH, AAL, AALL, AR	Input	Analog	4-20 mA	In	Existing. Signal to be relocated to CP.
	Pump Station pH	CR2-2	pH	AI, AAHH, AAH, AAL, AALL, AR	Input	Analog	4-20 mA	In	Existing. Signal to be relocated to CP.
	Reservoir Tank Residual Chlorine	CR3-1	Chlorine Residual	AI, AAHH, AAH, AAL, AALL, AR	Input	Analog	4-20 mA	In	Existing. Signal to be relocated to CP.
Chlorine Residual Analyzer									
	Chlorine Residual Analyzer	AIT-1	Chlorine Residual	AI, AAHH, AAH, AAL, AALL, AR	Input	Analog	4-20 mA	In	
			Analyzer Failure	YA	Input	Discrete	24 VDC	In	
Chlorine Feed Pumps									
	Chlorine Feed Pump 1	CFP-1	Run Indication	YI, KQ, YQ	Input	Discrete	24 VDC	In	Provide new HOA switch.
			Start/Stop Control	OC/CC	Output	Discrete	24 VDC	In	
			Speed Control	SC	Output	Analog	4-20 mA	In	Existing Pulsafeeder pump.
	Chlorine Feed Pump 2	CFP-2	Run Indication	YI, KQ, YQ	Input	Discrete	24 VDC	In	Provide new HOA switch.
			Start/Stop Control	OC/CC	Output	Discrete	24 VDC	In	
			Speed Control	SC	Output	Analog	4-20 mA	In	Existing Pulsafeeder pump.
Existing Pumps									
P-1	Booster Pump 1	NC-1	In Remote Indication	HSI_R	Input	Discrete	24 VDC	In	Provide new HOA switch.
			Run Indication	YI, KQ, YQ	Input	Discrete	24 VDC	In	
			Failure Indication	YA	Input	Discrete	24 VDC	In	
			Start/Stop Control	OC/CC	Output	Discrete	24 VDC	In	
P-2	Booster Pump 2	NC-2	In Remote Indication	HSI_R	Input	Discrete	24 VDC	In	Provide new HOA switch.
			Run Indication	YI, KQ, YQ	Input	Discrete	24 VDC	In	
			Failure Indication	YA	Input	Discrete	24 VDC	In	
			Start/Stop Control	OC/CC	Output	Discrete	24 VDC	In	
UV System (Oem system comprised of Isolation valves, cleaning system, ballasts, and associated instruments.)									
	UV System Control Panel 1	UV-1	Multiple Parameters		Various	Various	Ethernet	In	
	UV Reactor 1 Flow	FIT-1	Flow Indication	FI, FR	Input	Analog	4-20 mA	In	
			Totalizer Pulse	FY, FQ	Input	Discrete	24 VDC	In	
	UV System Control Panel 2	UV-2	Multiple Parameters		Various	Various	Ethernet	In	
	UV Reactor 2 Flow	FIT-2	Flow Indication	FI, FR	Input	Analog	4-20 mA	In	
			Totalizer Pulse	FY, FQ	Input	Discrete	24 VDC	In	

Item No.	Equipment Item	Equipment Designation	Description	Function Designation	Input or Output	I/O Type	Electrical Characteristic	In/Out Building?	Remarks
Utilities									
	Generator	GEN-1	Run Indication	YI, KQ, YQ	Input	Discrete	24 VDC	In	
			Failure Indication	YA	Input	Discrete	24 VDC		
	Automatic Transfer Switch	ATS-1	On Utility Power	JL_Utility	Input	Discrete	24 VDC	In	
			On Generator Power	JL_Gen	Input	Discrete	24 VDC	In	
Auto Dialer									
	Channel 1	AD-1	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 2	AD-2	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 3	AD-3	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 4	AD-4	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 5	AD-5	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 6	AD-6	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 7	AD-7	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 8	AD-8	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 9	AD-9	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 10	AD-10	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 11	AD-11	Alarm Indication	YA	Output	Discrete	24 VDC	In	NO Contact for alarm from PLC
	Channel 16	AD-16	Alarm Indication	YA	Output	Discrete	24 VDC	In	NC Contact for PLC Failure
PLC Status									
PLC-NB			PLC Memory Battery	MEM_BATT	Internal Value	Internal Value		In	
PLC-NB			AC Power Loss	AC_LOSS	Input	Discrete	24 VDC	In	N.O. contacts energized closed while power is On.
PLC-NB	Primary DC Power Supply Failure		Failure Indication	DCPS_PRI_FAIL	Input	Discrete	24 VDC	In	
PLC-NB	Secondary DC Power Supply Failure		Failure Indication	DCPS_SEC_FAIL	Input	Discrete	24 VDC	In	
PLC-NB	Uninterruptible Power Supply (UPS)		On Battery Indication	UPS_ON_BATT	Input	Discrete	24 VDC	In	
PLC-NB	PLC Cabinet Internal Temperature		Temperature Indication	TI, TAH, TAL, TR	Input	Analog	4-20 mA	In	

SECTION 17400

FLOW METERS (MAGNETIC TYPE)

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. The Contractor shall furnish and install, ready to operate, the magnetic-type flow metering equipment, complete with flow transmitters and all necessary accessories, in compliance with the following specifications and as shown on the Contract Drawings.

1.02. 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 equipment and services specified in this section, as well as all other Division 17 specifications.
- B. For ease of identification, designations for the various components of the metering systems to be furnished and installed are given in the following table.

TABLE 17400-1

SCHEDULE OF MAGNETIC FLOW METERING EQUIPMENT

Nameplate Designation	Flow Transmitter/ Element Flow Designation	Size	Liner Material	Flow Range (gpm)
UV Influent Flow (FIT-1,2)	FIT/FE-1,2	8-inch	PTFE or PFA	0 to 2000

1.03. RELATED SECTIONS

The specifications sections listed below are an integral part of this equipment specification and the Contractor shall be responsible for providing these sections to the equipment suppliers:

- A. Section 09900 - PAINTING
- B. Section 16055 - ELECTRICAL WORK
- C. All Division 17 specifications

All electrical equipment and wiring shall be in full compliance with Division 16, Electrical Specifications.

1.04. REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- B. NEMA ICS 3 - Industrial Systems.
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- D. NFPA 70 - National Electrical Code.

- E. ISO 9001
- F. National Institute of Science and Technology (NIST) - Calibration method.

1.05. SUBMITTALS

- A. Shop Drawings - Submit under provisions of Sections 01300, Submittals, and 01640, Equipment-General.
 - 1. Refer to Section 17000, Instrumentation, for shop drawing format and content.
- B. Operation and Maintenance Manual - Submit under provisions of Sections 01300, Submittals, and 01640, Equipment-General.
 - 1. Refer to Section 17000, Instrumentation, for operation and maintenance manual format and content.
 - 2. NIST calibration certificates for each flow meter.
- C. Project Record Documents - Submit under provisions of Sections 01300, Submittals, and 01640, Equipment-General.
 - 1. Refer to Section 17000, Instrumentation, for project record documents format and content.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Sections 01600, Materials, Equipment; 01640, Equipment-General; and Section 16055, Electrical Work.
- B. Accept products on site in factory containers unless system is completely integrated into a pre-manufactured panel that has been factory tested. Inspect for damage.
- C. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

1.07. MANUFACTURER QUALIFICATIONS

- A. Transmitter and flow tube shall be manufactured by, and at, an ISO 9001 company/facility.

1.08. WARRANTY

- A. Provide a two-year warranty for flow meters covering the entire unit including the electronics and the flow tube.

1.09. COORDINATION

- A. Coordinate flow tube mounting locations with the General Contractor. Provide the General Contractor with the spool piece according to their timeline for working on the respective segment of pipe.
- B. 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.

PART 2 PRODUCTS

2.01. MANUFACTURERS

A. The flow metering equipment manufacturer and model shall be the following or equal:

1. Where polyurethane or teflon liners are required by Table 17400-1:

- a. Foxboro 9300A series (1/2- to 16-inch) flow tubes
Foxboro Model IMT-25 SDADB10M-A-B flow transmitters
- b. Krohne Model IFS 4000 F flow tubes
Krohne Model IFC 100 flow transmitters
- c. Rosemount Model 8705 flow tubes
Rosemount Model 8732E flow transmitters

2.02. EQUIPMENT DESIGN

A. Flow Elements

- 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 housing shall be stainless steel or cast aluminum.
- 4. Flow tubes shall be lined as required by Table 17400-1.
- 5. 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.
- 6. 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.
- 7. 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.

B. Flow Transmitters - The electronics portion of the magnetic flow meters shall include both a magnet driver to power the magnet coils and a signal converter.

- 1. Signal converters shall be wall mounted, housed in a NEMA 4X enclosure.
- 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. The converter output shall be 4 to 20 mAdc into 800 ohms.
- 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.

C. 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. Refer to Table 17400-1 for flow ranges for each meter.
- 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.

2.03. ACCESSORIES

- A. Nameplates - Refer to Section 17000, Instrumentation. Wording of nameplate shall be as specified in Table 17400-1.
- B. Mounting Hardware - Provide stainless steel mounting hardware as necessary to mount equipment in locations as described in the Contract Documents.
- C. Cabling - Provide power, and signal, cable and conduit to locate transmitters in locations listed in Table 17400-1 and the Contract Documents according to Section 17000, Instrumentation.
- D. Lightning and Surge Protection - Provide lightning and surge protection for the equipment listed in Table 17400-1 in accordance with Section 17000, Instrumentation.
- E. 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.
- F. Spool Pieces - Provide one spool piece for each flow tube provided. Provide the General Contractor with the spool piece according to their timeline for working on the respective segment of pipe.
- G. Portable secondary calibrator for checking calibration of the magnetic flow meters shall be provided. The unit shall have an adjustable setting to simulate signal output for a given flow velocity from 0 to 99.99 ft/sec. This unit is not required for flow meters with calibration checking integral to the transmitters.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install all equipment furnished under this section in compliance with Sections 01600, Materials and Equipment, and 01640, Equipment-General.

3.02. SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. Installation - Include 1/2 day of a manufacturer-approved field technician's time to verify proper mounting of equipment.
- B. Final Acceptance - Include 1/2 day of a manufacturer-approved field technician's time to test equipment to demonstrate that:
 - 1. Flow metering systems have been properly installed, properly calibrated, and are functioning as specified.
 - 2. Grounding rings are installed, grounded to the flow tube, and the flow tube grounded to the building's grounding grid or a proper ground in the termination control panel where the flow rate signal is wired. Grounding to the pipe is not acceptable.
 - 3. Flow metering systems indicate the correct flow rate for three different rates of flow in the appropriate discharge line.
 - 4. Integral zero return is configured to eliminate erroneous readings.

5. Calibrated span of the flow meter's 4-20 mA output is visible manufacturer's nameplate of the flow tube.
 6. Configuration and setpoints are not lost upon power loss. This shall be tested by disconnecting the transmitter from power for 30 minutes.
 7. Flow Totalizer Pulse – Configure the transmitter to generate a pulse every unit of gallons. Unit of gallons shall be configured such that a pulse is not generated any more frequently than one pulse per second at peak flow.
 8. Submit a written report to the Engineer and the CSI with the results of field testing. In the report, include span and range of the 4-20 mA output signal from the flow transmitter.
- C. Submit a written report to the Engineer and the system integrator with the results of field testing. In the report, include span and range for the 4-20 mA output signal.
- D. Training - Provide 1/2 day of instruction for four persons to be conducted at the project site with a manufacturer's representative. Notify the Engineer and Owner in writing a minimum of two weeks in advance. Training shall include calibration, troubleshooting, and maintenance.

3.03. CERTIFICATION OF TESTING

- A. Unless waived in writing by the Engineer, all tests shall be made in the presence of a duly authorized representative of the Owner. 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. All tests shall be performed in the presence of the Owner. Written notice of all tests shall be given the Owner at least two weeks in advance.

END OF SECTION

SECTION 17560

COMPUTER WORKSTATIONS AND ASSOCIATED EQUIPMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. This section includes computer and networking equipment required to construct a data collection and control system that shall comprise a complete SCADA system in conjunction with other Division 17 specifications. Hardware specified herein includes, but are not limited to, the following:
 - 1. Ethernet switches.
 - 2. Ethernet communication devices and accessories.
 - 3. Category 6, Ethernet cabling and accessories.
 - 4. Firewalls.

1.02. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01600 - MATERIAL AND EQUIPMENT
- C. Section 01640 - EQUIPMENT-GENERAL
- D. Section 01700 - CONTRACT CLOSEOUT
- E. All Division 17 specifications

1.03. REFERENCES

- A. Electronic Industries Association (EIA).
- B. Federal Communication Commission (FCC).
- C. CCITT (International Telegraph and Telephone Consultative Committee), V.32, V.42, and V.42bis.
- D. Institute of Electrical and Electronic Engineers (IEEE), IEEE C62.41.
- E. IEEE 802.3 - Ethernet standards.
- F. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- G. Business and Institutional Furniture Manufacturers Association (BIFMA).
- H. TIA/EIA-568-B

1.04. DEFINITIONS

- A. Termination - All terminations shall include an end fitting, such as a male RJ-45 plug for copper Ethernet cabling. Terminated cabling is ready for connection to equipment.
- B. LAN - Local Area Network.
- C. WAN - Wide Area Network.

1.05. SUBMITTALS

- A. Shop Drawings - Submit under provisions of Sections 01640 and 01300. The following submittal requirements are to complement the requirements and format set forth in Section 17000 and are required for all equipment specified herein.
 - 1. Submit product data for each component specified and clearly indicate options provided.
 - 2. Submit manufacturer's installation instructions.
 - 3. Submit proposed training course. Include institution name, training location, course description, institution departmental contacts, and the proposed dates and times of the sessions.
 - 4. Submit one sample of the proposed wall-mounted Category 6 Ethernet port, include faceplate. Sample shall display labeling technique. Only one sample need be submitted in the Engineer's copy of the shop drawings, not one for every shop drawing copy. Sample will be retained, by the Engineer.
- B. Operation and Maintenance Manual - Submit under provisions of Sections 01600 and 01300. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
 - 1. Include operating instructions for each model Ethernet switch in electronic PDF format on DVD or USB thumb stick and supply one printed hardcopy. Document shall provide details on how to configure the switch through the web interface, including IP addresses assignment, steps required to assign a ring master, managing passwords, configuring Virtual Local Area Networks (VLANs), and shall also define the Ethernet switch's default configurations, including default username and password to access the web interface.
- C. Project Record Documents - Submit under provisions of Sections 01300, 01640, and 17000.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Accept products on site in factory containers and verify damage.
- B. Contractor shall maintain a temperature (50 to 85 degrees F) and humidity controlled (non-condensing), dust-free environment for stored and installed locations of all computing equipment.
- C. Contractor is responsible for cleaning installed computer equipment daily, including dusting off monitors, keyboards, mice, towers, and all horizontal surfaces within the room of which the computer is mounted.

- D. Contractor is responsible for maintaining a secure environment for the computer throughout construction, while enabling the Owner and Engineer routine access to the computers. Contractor shall be responsible for replacing stolen computing equipment and software and, as such, it is recommended the Contractor carry such insurance to facilitate prompt replacement of stolen equipment.

1.07. ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature above 32 degrees F (0 degrees C) and below 104 degrees F (40 degrees C) during and after installation of products.
- B. Maintain an area free of dirt and dust during and after installation of products.

1.08. WARRANTY

- A. Lifetime limited warranty on all Ethernet switches.

1.09. EXTRA MATERIALS

- A. Two additional RJ-45 Ethernet wall jacks.
- B. Five 25-foot Category 6 patch cords for each computer shown on the SCADA Architecture diagram with both ends terminated with snagless RJ-45 plugs.
- C. One spare DIN-rail mounted Ethernet switch for each model provided.
- D. One spare DIN-rail mounted firewall for each model provided

PART 2 MATERIALS

2.01. GENERAL

- A. Equipment provided under each subsection shall be by one manufacturer whenever possible.

2.02. ETHERNET SWITCHES (DIN-RAIL MOUNTED)

- A. General
 - 1. Provide DIN-rail mounted fast Ethernet switches for mounting in PLC enclosures as identified on the SCADA Architecture diagram.
 - 2. Provide quantities of switches in each location shown in the SCADA Architecture diagram as necessary to achieve the total quantity of fiber and copper Ethernet ports required. Provide the quantities of fiber and copper ports illustrated on the SCADA Architecture Diagram, with the following minimum: maintain two spare copper Ethernet ports in each switch.
 - 3. Specifications
 - a. Software Layer 2 Enhanced with Internet Group Multicast Protocol (IGMP) snooping enabled.
 - b. Light source optimized to function with 50 micron/125 micron (core/cladding diameter) fiber optic cabling with duplex SC connectors.

- c. Fiber optic link budget (loss) no greater than 8.0 dB at 1300-nanometers over 0 to 5,000 meters.
 - d. DIN-rail mounted, fanless design.
 - e. Manufacturer-rated for industrial use, including temperatures of 0 to 60 degrees C, humidity 10 to 95 percent non-condensing, and an Mean Time Between Failures (MTBE) manufacturer rating greater than 40 years.
 - f. IEC 60068-2-27 conformity for shock. Capable of withstanding 18 shocks at 15 g of 11 ms in duration.
 - g. IEC 60068-2-6 conformity for vibration.
 - h. EN 61000-4 conformity for immunity to electro-magnetic interference (EMI).
 - i. Support 256 virtual Local Area Networks (VLANs).
 - j. Removable terminal blocks with screw compression.
 - k. Capable of being powered from redundant/dual DC power supply sources.
 - l. LEDs for Link and Activity per port. Failure LED for switch.
 - m. Capable of supporting a self-healing, fiber optic ring structure with a reconfiguration time less than 0.3 seconds.
 - n. Device configuration and monitoring shall be achieved through a web-browser interface via the Ethernet TCP/IP protocol. The device shall include an embedded web server to access configuration and status pages. Ethernet switches that utilize separate configuration software packages are not acceptable.
 - o. One Form C relay output contact, user-configurable to indicate start-up failure, a broken ring segment, or other warning events.
4. Manufacturers shall be:
- a. Hirschmann, RS20 Series.
 - b. Allen-Bradley, Stratix 8000 Series.
 - c. Moxa Technologies, EDS 500 Series.
 - d. N-Tron equipment is not acceptable.
5. Completely compatible and optimized by the CSI for use with the supplied PC HMI (PLC OIT), PLC CPUs and other networked equipment.

2.03. FIREWALLS (DIN-RAIL MOUNTED)

A. General

- 1. Provide DIN-rail mounted firewalls for mounting in PLC enclosures as identified on the SCADA Architecture diagram.

2. Provide quantities of firewalls in each location shown in the SCADA Architecture diagram as necessary.
3. Specifications
 - a. DIN-rail mounted, fanless design.
 - b. Manufacturer-rated for industrial use, including temperatures of -20 to 60 degrees C, and humidity 95 percent non-condensing.
 - c. IEC 60068-2 conformity for shock and vibration.
 - d. Support 30 virtual Local Area Networks (VLANs).
4. Manufacturers shall be Cisco, ASA 5506H-X, or equal.
5. Completely compatible and optimized by the CSI for use with the supplied PC HMI (PLC OIT), and Ethernet switches.

2.04. CATEGORY 6 ETHERNET CABLING

- A. Furnish and install Ethernet cabling in conduit to connect networked PLCs, computers, industrial workstations, and wall-mounted Ethernet jacks to the networked Ethernet switches as shown in the Contract Drawings and in accordance with the project documents.
- B. Specifications
 1. Four-pair, 24 AWG cable. 100 percent overall foil shield bonded to jacket inner wall. Braided drain wire.
 2. PVC jacket sequentially marked at 2-foot intervals.
 3. Bonded pairs.
 4. Color coded as follows: White with blue stripe, blue, white with orange stripe, orange, white with green stripe, green, white with brown strip, brown. White conductors must be striped.
 5. Allowable pulling tension of 45 lbs.
 6. Broadcasting quality of 270 Mbps, minimum.
 7. In accordance with the TIA/EIA 568-B.2 Category 6 standard.
 8. RJ-45 compatible.
 9. Input impedance of 100 ± 15 ohms up to 100 MHz.
 10. Documented and certified performance up to 300 MHz.
 11. Sunlight and oil-resistant PVC jacket. Color Blue.
 12. Manufactured by Belden, DataTuff, or equal.

2.05. ACCESSORIES

- A. Provide all necessary cabling including, but not limited to, switch uplink cabling, patch cords, network modem Category 6 Ethernet cabling, and power cords in lengths as necessary to locate equipment as specified and directed by the Engineer.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Assemble and configure all computer equipment, configure switches, connect computers to all networking equipment, locate equipment within the plant in locations as shown on the Contract Documents and as directed by the Engineer.
- B. Terminate Category 6 cabling in accordance with TIA/EIA-568-B pin/pair assignments for 100-Ohm balanced twisted pair cabling (T568B), as follows:
 - 1. Pin 1 - White with orange stripe.
 - 2. Pin 2 - Orange solid.
 - 3. Pin 3 - White with green stripe.
 - 4. Pin 4 - Blue solid.
 - 5. Pin 5 - White with blue stripe.
 - 6. Pin 6 - Green solid.
 - 7. Pin 7 - White with brown stripe.
 - 8. Pin 8 - Brown solid.
- C. Ethernet Switch Configuration - Include on-site time for a factory-trained, manufacturer's representative to configure all Ethernet switches as follows:
 - 1. Program IP addresses into each switch using IP addresses supplied by the Engineer.
 - 2. Configure parameters appropriate for an industrial control network including, but not limited to, enabling IGMP snooping and QoS.
 - 3. Configure Ethernet switches to function in a self-healing, redundant ring architecture.
 - 4. Advise Engineer of parameters available for the Ethernet switch's integral relay output contact and program as selected by the Engineer.
 - 5. Assist in troubleshooting network issues at the request of the Engineer.
 - 6. Configure managed Ethernet switches - Coordinate configuration of managed switch properties with the Engineer via shop drawings. Schedule a meeting with the Engineer prior to in-field switch configuration to review switch configuration parameters and discuss intended managed switch function. Switch configuration shall occur before any Ethernet devices are put into service. Perform site visits for switch configuration to meet the sequence of construction. Switch configuration may

include: routing, development of up to three Virtual Local Area Networks (VLANs), configuration of IP addresses, traffic management, rules, and setup of switch management software of multiple computers. Contractor shall take the lead on researching, collecting, and presenting all available configuration options.

- D. Install cables in the raceway systems. Inspect raceways prior to pulling in cables. Rod and swab out conduits and ducts prior to installing cables. Notify the Engineer of any conditions, which would prevent installation of the specified cables, in writing before proceeding with the installation.
- E. Provide adequate put-up lengths on cable reels to make termination-to-termination runs without splices. Spliced cables are not acceptable.
- F. Support cables in riser conduits at intervals as required by NEC and cable manufacturer.
- G. Installation tools and materials shall be approved by the cable manufacturer.
- H. Reroute and reorganize network cabinet cable routing and equipment layout as requested by the Engineer in the field.

3.02. IDENTIFICATION

- A. Label each termination point on each end of the Category 6 cable. For example, each cable shall be labeled as "PLC-3/Port 6", "PLC-3A/Port 2", "Superintendent's Office Jack 1/Port 3", etc.
- B. Tag each cable in junction boxes.
- C. Check cables and wires for proper identification numbering and color-coding.

3.03. CHECKOUT AND TESTING

- A. Upon receipt of Category 6 reels, perform pre-installation ("on the reel") measurements to verify attenuation, length and continuity. Record the results of all measurements and submit to the engineer. Cables that fail continuity or that have higher than specified attenuation shall be subject to rejection and shall be replaced at no additional cost to the Owner.
- B. Make the following tests after cable installation:
 - 1. Upon completion of the cable installation, perform 100 percent bi-directional end-to-end loss testing of cable runs between each port and switch.
 - 2. The calculated and measured values of the end to end shall be in accordance with Category 6 standards. In the event that any differences are in excess, implement troubleshooting techniques and methods to provide agreement. If the discrepancies cannot be reconciled, the cable installation shall be removed, replaced, and retested at no additional cost to the Owner.

3.04. CERTIFICATION OF TESTING

- A. Unless waived in writing by the Engineer, all tests shall be made in the presence of a duly authorized representative of the Owner. 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. All tests shall be performed in the presence of the Owner. Written notice of all tests shall be given the Engineer and Owner at least two weeks in advance.

END OF SECTION

SECTION 17561
INDUSTRIAL PC (IPC)

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Furnish and install industrial PCs (IPCs) in enclosures with all supporting equipment. This section does not include programming and configuration of the IPCs.
- B. Supervisory software.
- C. Miscellaneous software.

1.02. 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 equipment and services specified in this section, as well as all other Division 17 specifications.
- B. For ease of identification, designations for the various components of the metering systems to be furnished and installed are given in the following table.

TABLE 17561-1

SCHEDULE OF INDUSTRIAL PCs

Nameplate Designation	Location	Type
CLIENT1	PLC Cabinet NB, UV Facility	Industrial PC

1.03. RELATED SECTIONS

The specifications sections listed below are an integral part of this equipment specification and the Contractor shall be responsible for providing these sections to the equipment suppliers:

- A. Section 01300 – SUBMITTALS
- B. Section 01400 - QUALITY CONTROL
- C. Section 01600 - MATERIAL AND EQUIPMENT
- D. Section 01640 - EQUIPMENT GENERAL
- E. Section 01700 - RECORD DOCUMENTS
- F. Section 16055 - ELECTRICAL WORK
- G. Section 16161 – CONTROL PANELS AND ENCLOSURES
- H. All Division 17 specifications

All electrical equipment and wiring shall be in full compliance with Division 16, Electrical Specifications.

1.04. REFERENCES

- A. Electronic Industries Association (EIA).
- B. Federal Communication Commission (FCC).
- C. CCITT (International Telegraph and Telephone Consultative Committee), V.32, V.42, and V.42bis.
- D. Institute of Electrical and Electronic Engineers (IEEE), IEEE C62.41.
- E. NEMA ICS 1 - General Standards for Industrial Control and Systems.
- F. Business and Institutional Furniture Manufacturers Association (BIFMA).

1.05. DEFINITIONS

- A. Industrial PC - Refer to Article 2.01.

1.06. SUBMITTALS

- A. Shop Drawings - Submit under provisions of Sections 01300 and 01640.
 - 1. Refer to Section 17000 for shop drawing format and content.
 - 2. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
 - a. Submit details of all software specified and include type and version, options, network capabilities, license agreement, and system requirements.
- B. Operation and Maintenance Manual - Submit under provisions of Sections 01300 and 01640.
 - 1. Refer to Section 17000 for operation and maintenance manual format and content.
 - 2. The following submittal requirements are to complement the requirements and format set forth in Section 17000.
 - a. Provide original manufacturer programming manuals, technical reference manuals, and user manuals.
- C. Project Record Documents - Submit under provisions of Sections 01300 and 01640.
 - 1. Refer to Section 17000 for project record documents format and content.

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Sections 01600 and 01640.
- B. Accept products on site in factory containers unless system is completely integrated into a pre-manufactured panel that has been factory tested. Inspect for damage.

- C. Store products in clean, dry area; maintain temperature to NEMA ICS 1 requirements.

1.08. MAINTENANCE SERVICE

- A. Provide manufacturer's maintenance services for one year from date of Substantial Completion.
- B. Provide Owner with toll-free phone numbers for technical information and assistance on system programming and IPC.

1.09. WARRANTY

- A. Provide a one-year warranty from date of Substantial Completion.

1.10. COORDINATION

- A. Coordinate IPC compatibility and operational features with the programmer of the PLCs.

1.11. SPARE PARTS

- A. Provide the following uninstalled spare parts that are identical to and interchangeable with the original parts. Spare parts shall be furnished in clearly identified containers, protected in accordance with the manufacturer's requirements.

- 1. One industrial PC.

1.12. SOFTWARE DATE OF RELEASE

- A. All software provided under this section shall be the most recent version at time of substantial completion. Provide software updates and upgrades up to the time of final completion.

PART 2 MATERIALS

2.01. INDUSTRIAL PC

- A. Provide IPCs as listed in Table 17561-1 in accordance with the following specifications.
- B. Monitor
 - 1. 19-inch minimum, 1600x900 minimum resolution, color, 16:9 aspect ratio.
 - 2. Mounting - Integral with flat panel case.
 - 3. Adjustments - Manual adjustment of vertical, horizontal and brightness.
- C. Specifications
 - 1. DVD-ROM drive.
 - 2. Hard Drive - 60 GB (minimum) at 7200 RPM.
 - 3. CPU - Intel Core i3/i5/i5.
 - 4. Operating System - Windows 7.

5. RAM - 2 Gig DDR3 1333/1600MHz SO-DIMM (Minimum).
 6. Touch Panel Type - Analog resistive film or PCAP.
 7. USB2.0 or USB3.0 Ports - Six, minimum.
 8. Ethernet Ports - Two.
 9. Conforming to standards: UL1604, UL508, EN55011 Class A, EN61000-3-2, EN61000-3-3, EN61000-6-2, EN61131-2, 47 CFR Part 15 Class A.
 10. Approved by the manufacturer for the installed environment.
 11. Network Interfaces - Refer to Section 17100.
 12. Provide lockable, gasketed cover for serial port, parallel port, keyboard port, and disk drive. Cover shall be located on front of unit.
 13. IPC shall be mounted in same enclosures as the PLC. See Contract Drawings for configurations. Centerline of screen shall be 5 feet, 0 inches above finished floor. Keyboard - None; touchscreen only.
 14. IP65 front bezel and fanless design.
- D. Provide touchscreen and software driver. Provide one licensed copy of Microsoft Small Business (Microsoft Word and Microsoft Excel). Microsoft Small Business is not required for the spare IPC.
- E. Manufacturer shall be Proface, Total Control Solutions, Hope Industrial Systems, Advantech, or equal.

2.02. SUPERVISORY SOFTWARE

- A. Provide supervisory software that meets the following requirements:
1. The Contractor shall include a purchase allowance of \$13,000 for the purchase of supervisory software, with a developer key and reporting software.
 2. The Owner and Engineer will determine the time of purchase during the submittal process, and will furnish procurement specifications including features, manufacturer and model number at the time of procurement by the Contractor.
 3. Allowance shall include the following:
 - a. Supervisory Software - Development license (900 tags).
 - b. Reporting software.
 - c. All other accessories as selected by the Owner and Engineer during the submittal process. Operating system software shall be the latest revision at the time of delivery.
 4. Allowance shall not include the following:
 - a. Procurement, shipping, installation, or configuration of software.

- b. Any other drivers that may be required under separate specification sections other than driver for PLCs provided under Section 17100.
 - c. Any other software or software manufacturer provided programming, user, or configuration manuals that may be required under separate specification sections.
 - d. Training
 - e. Contractor overhead and profit.
 - f. Purchasing the IPC.
5. Based on the Owner and Engineer furnished purchase specifications, submit invoice and provide credit to the Owner based on the difference between the invoice price at the time of delivery to Engineer and allowance amount.

PART 3 EXECUTION

3.01. GENERAL

- A. All items specified shall be completely assembled.
- B. Provide miscellaneous cabling, software, and equipment as required to accomplish functions as specified.
- C. Provide manufacturer services and instruction per Section 01600.
- D. Provide all software licenses for software as required to accomplish system functions as described herein.
- E. Provide all software, drivers, and miscellaneous cabling as required to accomplish system described.
- F. Contractor shall be responsible for all labor, effort, testing/troubleshooting, and costs associated with diagnosing and replacing industrial workstations that are suspect of being defective as determined by the Engineer during construction.

END OF SECTION

SECTION 17601

CHLORINE RESIDUAL ANALYZERS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. The Contractor shall furnish and install, ready to operate, the following chlorine analyzing equipment complete with all necessary accessories to measure chlorine residual concentrations as indicated herein in compliance with the following specifications and as shown on the Contract Drawings.

1.02. GENERAL REQUIREMENTS

- A. It is a requirement of this specification that all Division 17 specifications be provided by a single supplier. This supplier shall have total responsibility for the entire system performance and compatibility of this section as well as all other Division 17 specifications.
- B. For ease of identification, designations for the various components of the system to be furnished and installed are given in Table 17601-1.

TABLE 17601-1

SCHEDULE OF CHLORINE ANALYZERS

Service Nameplate Designation	Equipment Designation	Measurement	Location
Filtered Water Chlorine Residual	AIT-1	Free chlorine residual	Pumping station

1.03. RELATED SECTIONS

- A. Section 01300 - SUBMITTALS
- B. Section 01600 - MATERIAL AND EQUIPMENT
- C. Section 01640 - EQUIPMENT-GENERAL
- D. Section 09900 - PAINTING
- E. All Division 17 specifications

All electrical equipment and wiring shall be in full compliance with Division 16, Electrical Specifications.

1.04. REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control and Systems
- B. NEMA ICS 3 - Industrial Systems
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems

- D. NFPA 70 - National Electrical Code

1.05. DEFINITIONS

- A. System Supplier - The party responsible for all of Division 17 specifications.
- B. DPD - (N,N-diethyl-p-phenylenediamine) colorimetry. Method of measurement for free and total chlorine residual.

1.06. SUBMITTALS

- A. Shop Drawings - Submit under provisions of Sections 01640 and 01300.
 - 1. Refer to Section 17000 for shop drawing format and content.
 - 2. Submit manufacturers calibration information as follows: frequency of calibration anticipated for this installation, chemicals required for calibration, quantities of these chemicals required for each calibration, cost of each chemical required in \$/L, and closest stocking location to the Owner for replacement chemicals and replacement parts for this analyzer.
- B. Operation and Maintenance Manual - Submit under provisions of Sections 01640 and 01300.
 - 1. Refer to Section 17000 for operation and maintenance manual format and content.
- C. Project Record Documents - Submit under provisions of Sections 01640 and 01300.
 - 1. Refer to Section 17000 for project record documents format and content.

1.07. WARRANTY

- A. Provide a two-year warranty for the chlorine analyzers covering the entire unit including the electronics, sensor/analyzing cell, and integral reagent pump.

1.08. COORDINATION

- A. Coordinate with the installer of the sample lines. Verify that sample lines installed will provide the manufacturer's suggested volumetric flow through the flow cell. Verify that the sample discharge line is sized to accommodate the flow to the drain.

1.09. EXTRA MATERIALS

- A. One-year supply of calibration fluids. Fluids shall not require dilution.
- B. One-year supply of sample water conditioning reagents (pH 4 Buffer Solution - Acetic Acid, Ammonium Sulfate Solution).
- C. One annual maintenance kit including preassembled reagent tubing, fittings, caps, and funnel.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. All chlorine analyzing equipment on this project shall be by the same manufacturer. Where specifications deviate from the suggested manufacturer disregard the manufacturer and adhere to the specifications. Manufacturer and series shall be the following, or equal:

1. HACH, Model CL17, or equal

2.02. EQUIPMENT DESIGN

A. General

1. Analyzers shall utilize an EPA-approved online method of DPD colorimetric analysis. Provide chlorine residual analyzers as listed in Table 17601-1.
2. Analyzer shall sample every 2.5 minutes and provide a percentage every 2.5 minutes, minimum.

B. Analyzer

1. An isolated 4-20 mA output signal directly proportional to chlorine residual.
2. User interface shall include a touch keypad and backlit sunlight readable LCD alphanumeric display. The interface shall be menu driven facilitating calibration, configuration, and troubleshooting.
3. The electronics shall incorporate non-volatile memory for maintaining calibration and set up parameters in case of power loss.
4. Two independently adjustable alarm relays shall be provided. Relay contacts shall be rated 5 amps at 250 volts. Alarm relays shall be configurable for residual limits, system warning, and system shutdown.
5. NEMA 4X enclosure with polycarbonate window for viewing of display. Unit shall not require to be opened to view process values or to perform calibration.

C. Performance Requirements

1. Accuracy - 0.035 mg/L or ± 5 percent of full scale, whichever is greater.
2. Sensitivity - 0.005 mg/L or ± 5 percent of full scale, whichever is greater.
3. Minimum Detection - 0.035 mg/L
4. Stability - ± 1 percent of full-scale for one month.
5. Response Time - 150 seconds maximum.
6. Impedence - 750 ohms, maximum.
7. Sample Flow Rate - 8 to 10 LPM (2.1 to 2.6 gpm). Maximum pressure of 60 psi.

- 8. Operating Temperatures
 - a. Ambient - 35 to 125 degrees F
 - b. Sample Temperature - 26 to 125 degrees F
- 9. Power Requirement - 120 VAC, corded plug.

2.03. ACCESSORIES

- A. Nameplates - Refer to Section 17000. Wording of nameplate shall be as specified in Table 17601-1.
- B. Mounting Hardware - Provide stainless steel mounting hardware as necessary to mount equipment in locations as described in the Contract Documents.
- C. Cabling - Provide power, and signal, cable and conduit to locate equipment in locations listed in Table 17601-1 and the Contract Documents according to Section 17000.
- D. Lightning and Surge Protection - Provide lightning and surge protection for the equipment listed in Table 17601-1 in accordance with Section 17000.
- E. Calibration Kit - Provide one calibration kit containing all equipment as suggested by the manufacturer to calibrate the unit. If available, provide calibration equipment in an impact-resistant plastic carrying case.
- F. Provide sample water conditioning reagents as necessary to monitor chlorine residual.

PART 3 EXECUTION

3.01. EQUIPMENT INSTALLATION

- A. Install chlorine analyzers in accordance with the manufacturer's requirements.
- B. All electrical work performed in fabrication and installation of the chlorine analyzers shall be in full accordance with the requirements of the Division 16 specifications.
- C. Mount all equipment provided herein in accordance with Section 17000.

3.02. MANUFACTURER'S OR SYSTEM INTEGRATOR'S FIELD SERVICES

- A. Test all the chlorine analyzer equipment to demonstrate that:
 - 1. The analyzer has been properly installed, properly calibrated, and is functioning as specified.
 - 2. The analyzer indicates the correct free chlorine contact for four different known chlorine concentrations.
 - 3. Setpoints and alarms are functioning correctly.
- B. Final Acceptance - Include 1/2 day for a manufacturer authorized service representative to test equipment to demonstrate that the system operates as specified.

- C. Installation - Include one day for a manufacturer authorized service representative to verify proper mounting of the equipment, including mounting technique, mounting surface, and functional location.
- D. Training - Provide 2, 1/2-day sessions of instruction to be conducted at the project site with a manufacturer's representative. Notify the Engineer and Owner in writing a minimum of two weeks in advance. Training shall include calibration, troubleshooting, and maintenance. Duration of training is actual on-site training time with the operators, travel and other time shall be separate from this training requirement. Refer to Section 17000 for additional training requirements.

3.03. CERTIFICATION OF TESTING

- A. Unless waived in writing by the Engineer, all tests shall be made in the presence of a duly authorized representative of the Owner. 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. All tests shall be performed in the presence of the Owner. Written notice of all tests shall be given the Owner at least two weeks in advance.

END OF SECTION