

**CONTRACT AND SPECIFICATIONS  
FOR  
WATER SYSTEM CHLORINATION & PRETREATMENT  
PRUDENCE ISLAND WATER DISTRICT**

**DECEMBER 2021**

**Prepared For:**

**PRUDENCE ISLAND WATER DISTRICT  
PO BOX 93  
PRUDENCE ISLAND, RI 02872**

**FOR PERMITTING**



**Prepared By:**

 **H<sub>2</sub>Olson Engineering, Inc.**  
DRINKING WATER PROFESSIONALS



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SECTION 00010  
INVITATION TO BID

The Prudence Island Water District (PIWD) is seeking sealed Bids for the Water System Chlorination and Pretreatment project. In general and without limitation, the work to be done under this contract includes the construction of a drinking water treatment plant including but not limited to furnishing and installing; precast concrete building and foundation; site preparation, grading, and restoration; yard piping, fittings, valves, hydrant, and appurtenances; infiltration basin; a packaged greensand pressure filtration system; backwash supply tank and pump; process piping and valves; pumps; chemical feed systems; instrumentation and controls; facility HVAC and electrical; start-up and performance testing. Bids will be received by the PIWD until **10:00 AM on August 15, 2022** at P.O. Box 93, Prudence Island, RI 02872, at which time the bids will be opened and publicly read aloud.

Bids must be enclosed in sealed envelopes and labeled as required in Part 6.2 A. of the Instructions to Bidders. All Bids must be submitted on the form in the Contract Documents and clearly marked:

Water System Chlorination and Pretreatment

Prospective Bidders are asked to attend a Pre-Bid Conference on **July 25, 2022 at 10:00 AM**, to be held at the Indian Springs Well Site located off of Homestead Avenue, Prudence Island, RI.

Electronic Contract documents may be obtained at H2Olson Engineering, Inc. between the hours of 8:30 am and 4:00 pm, weekdays. To request contract documents, contact Lisa Goyer at 508-375-7007 or email [LMG@h2olsonengineering.com](mailto:LMG@h2olsonengineering.com).

For hard copies, a refundable payment of \$50.00 in cash or check payable to H2Olson Engineering, Inc. will be required. Bidders requesting Contract Documents by mail shall add an additional non-refundable check payable to the H2Olson Engineering, Inc. in the amount of \$15.00 per set to cover costs of handling and mailing.

All work under this Contract is subject to the prevailing wage rates of the State of Rhode Island and the Davis Bacon Regulations, in accordance with RIGL 37-13-1. Certified payrolls will be required to be submitted for all work under this contract.

All Bidders must comply with the State of Rhode Island requirements regarding the participation of minority/women's business enterprises (MBE/WBE's) or DBE in the performance of this contract. The successful bidder will be required to include in their bid documents for subcontractors and MBE/WBE's "Fair Share" percentage which totals at least 10 percent (10%) of the dollar value of the entire procurement or project.

Bid Security in the form identified within the Instruction to Bidders, and in the amount of five (5) percent of the total Bid amount, must accompany each bid.

The successful Bidder must furnish a Performance and a Labor and Material Payment Bond, in the specific formats as attached herein, both for the full value of the Bid Price, along with all required insurance certificates, within ten (10) calendar days after the award date in order to execute a Contract.

No Bidder may withdraw his Bid within sixty (60) days following the closing time for receipt of Bids.

Time of completion is set at 300 days following the Notice to Proceed to complete all work. Liquidated damages will be in the amount of \$1,500.00 for each calendar day of delay from the date established for substantial completion.

The Prudence Island Water District will be financing all work through the State of Rhode Island Clean Water Finance Agency, utilizing the RI State Revolving Fund loan program. The prospective contractor shall be aware of and comply with all the requirements of receiving monies from the Clean Water Finance Agency, utilizing the RI State Revolving Fund for projects (i.e. Certified Weekly Payrolls, Davis Bacon requirements, Labor Standards Interviews, Certified Prevailing Wage Daily Logs, MBE/DBE requirements, etc.).

This project is subject to the American Iron and Steel requirements of P.L. 113-76, the Consolidated Appropriations Act of 2014.

The PIWD reserves the right to reject any and all Bids or parts thereof, to waive any irregularity in the Bids received, and to accept the Bid or parts thereof deemed to be most favorable to the best interest of the PIWD.

END OF SECTION

SECTION 00100

INSTRUCTIONS TO BIDDERS

PART 1 – SUMMARY

1.1 DOCUMENT INCLUDES

A. Invitation

1. Receipt and Opening of Proposals
2. Intent
3. Work Identified in the Contract Documents
4. Contract Period and Term of Agreement
5. Telegraphic Modification
6. Obligations of the Bidder
7. Prices

B. Bid Documents and Contract Documents

1. Definitions
2. Contract Documents Identification
3. Availability
4. Examination
5. Addenda and Interpretations
6. Product/System Substitutions
7. Delivery

C. Site Assessment

1. Site Examination
2. Pre Bid Conference

D. Qualifications

1. Qualifications of the Bidder
2. Subcontractors/Suppliers/Others

E. Bid Submission

1. Preparation of Bid
2. Submission of Bids

F. Bid Enclosures/Requirements

1. Bid Security
2. Agreement to Bond
3. Performance Bond and Labor and Material Payment Bond
4. Insurance

5. Bid Form Requirements
  6. Bid Form Signature
  7. Prevailing Wage Rates
  8. Tax Exemption
  9. Labor Regulations
  10. Additional Bid Information
- G. Offer Acceptance/Rejection
1. Duration of Offer
  2. Withdraw of Bids
  3. Acceptance of Offer
- H. Laws, Ordinances and Codes
- I. Time of Completion and Liquidated Damages
- J. Permits

## PART 2 – INVITATION

### 2.1 RECEIPT AND OPENING OF PROPOSALS

- A. Sealed bids/proposals will be accepted and time stamped upon receipt at the Prudence Island Water District, P.O. Box 93, Prudence Island, RI 02872; until the time, indicated on the attached Invitation to Bid, for the commodities, equipment or services listed in the specifications. Bid/Proposals will be publicly read at the time specified in the advertisement.
- B. Proposals submitted for a specified item must not be combined under the same cover with any other Bid item.
- C. Any Bid received after the time and date specified shall not be considered, by messenger or by mail, even if it is determined by the PIWD or the Engineer that such non-arrival before the time set for opening was due solely to delay in the mails for which the Bidder is not responsible. Conditional or qualified Bids will not be accepted.
- D. Submit Document 00400 - Supplements to Bid Forms with Bid Submission.

### 2.2 INTENT

- A. The intent of this Bid request is to solicit bids for the labor and materials necessary to install a chlorination and water treatment plant at the Indian Springs Well House and chlorination at the Arm Camp Well House located on Prudence Island, RI.

### 2.3 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

- A. Scope: The work to be done under this contract includes the construction of a drinking water treatment plant including but not limited to furnishing and installing; precast concrete



building and foundation; site preparation, grading, and restoration; yard piping, fittings, valves, hydrant, and appurtenances; infiltration basin; a packaged greensand pressure filtration system; backwash supply tank and pump; process piping and valves; pumps; chemical feed systems; instrumentation and controls; facility HVAC and electrical; start-up and performance testing.

- B. The Owner hereby reserves the right, at any time, or from time to time, to order additions, deletions, or revisions in the work to be authorized through a written amendment (change order), which shall be subject to the provisions in General Conditions - Article 10.

## 2.4 CONTRACT PERIOD AND TERM OF AGREEMENT

- A. Time of completion is set at 300 days following the Notice to Proceed to complete all work.

## 2.5 TELEGRAPHIC MODIFICATION

- A. Telephonic, telegraphic or oral Bids, amendments or withdrawals will not be accepted.

## 2.6 OBLIGATIONS OF THE BIDDER

- A. At the time of opening of Bids, each Bidder will be presumed to have inspected the Specifications and Contract Documents (including all Addenda), which have been sent to the address given by such Bidder. The failure or omission of any Bidder to receive or examine any form, instrument, or document or to inspect any item specified as a Trade-in shall in no way relieve any Bidder from any obligation in respect to his Bid.
- B. Any exceptions or deviations from the provisions contained in this Specification must be explained in detail and attached to the proposal. If such deviations do not depart from the intent of this notice and are in the best interest of the PIWD, the proposal will receive careful consideration.

## 2.7 PRICES

- A. Bidders shall state the proposed price in the manner as designed in the Bid Proposal Form. In the event that there is a discrepancy between unit prices and the extended totals, the unit price shall govern. In the event that there is a discrepancy between the price written in words and written in figures, the prices written in words shall govern.
- B. Bidders agree that the price in this Bid shall be irrevocable for 60 days, or until the Bid is awarded by the PIWD. After award by the PIWD, said prices shall then remain firm for the duration of the Contract.

## PART 3 - BID DOCUMENTS AND CONTRACT DOCUMENTS

### 3.1 DEFINITIONS

- A. Bid Documents: Contract Documents supplemented with Invitation to Bid, Instructions to Bidders, Bid Form, Supplements to Bid Forms, Appendices and Bid Securities, identified herein.

- B. Contract Documents: Defined in EJCDC 1910-8 Article 1, including issued Addenda.
- C. Bid, Offer, or Bidding: Act of submitting an offer under seal.
- D. Bid Price: Monetary sum identified by the Bidder in the Bid Form.
- E. Owner: Prudence Island Water District
- F. Engineer: H2Olson Engineering, Inc.

### 3.2 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified by the project title, “Water System Chlorination & Pretreatment”, as prepared by the Engineer, H2Olson Engineering, Inc. located at 10 Riverside Drive, Suite 103, Lakeville, MA 02347I and identified in the Table of Contents and Specifications.

### 3.3 AVAILABILITY

- A. Additional copies of the Bid Documents may be obtained between the hours of 8:30 a.m. and 3:00 p.m., Monday through Friday by emailing Lisa Goyer. (LMG@h2olsonengineering.com).
- B. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.

### 3.4 EXAMINATION

- A. Bid Documents may be viewed at the office of the Engineer.
- B. Upon receipt of Bid Documents verify that documents are complete. Notify Engineer should the documents be incomplete.
- C. Immediately notify the Engineer upon finding discrepancies or omissions in the Bid Documents.

### 3.5 ADDENDA AND INTERPRETATIONS

- A. No interpretation on the meaning of the Plans, Specifications or other Contract Documents will be made to any Bidder orally. Every request for such interpretations should be in writing, addressed to H2Olson Engineering, Inc. or emailed to Lisa Goyer. (LMG@h2olsonengineering.com). To be given consideration the request must be received at least seven (7) days prior to the date fixed for the opening of the bids. Fax transmissions will be accepted with written follow-up by Bidder.
- B. Any and all interpretations, and supplemental instructions, which, if issued, will be mailed by regular mail, emailed or faxed to all perspective Bidders (at the respective address furnished by the Bidder for such purpose), not later than 48 hours prior to the date fixed for

the opening of the bids (unless such addenda postpones the opening of bids). Failure of Bidder to receive any such addendum or interpretations shall not relieve any Bidder from obligation under this bid as submitted. All addenda so issued shall become part of the Contract Documents.

### 3.6 PRODUCT/SYSTEM SUBSTITUTIONS

- A. Where the Bid Documents stipulate a particular Product, substitutions will be considered by the Engineer up to 10 days before receipt of Bids.
- B. The submission shall provide sufficient information to determine acceptability of such products.
- C. When a request to substitute a Product is made, the Engineer may approve the substitution and will issue an Addendum to known Bidders.
- D. In submission of substitutions to products specified, Bidders shall include in their Bid, any changes required in the Work and changes to Contract Time and Contract Price to accommodate such substitutions. A later claim by the Bidder for an addition to the Contract Time or Contract Price because of changes in Work necessitated by use of substitutions shall not be considered.

### 3.7 DELIVERY

- A. All Purchases related to this bid are to be delivered FOB to the PIWD, delivery to be supplied with the Purchase Order. No extra charges for delivery, handling or other services will be honored. Only inside delivery and set-up, where required, will be accepted. **TAILGATE DELIVERIES WILL BE REFUSED.** The vendor must notify the PIWD 24 hours prior to delivery. All claims for damage in transit shall be the responsibility of the successful Bidder. The PIWD will not make payment on damaged goods, they must be replaced or adjustments made at the option of the PIWD. The PIWD is only represented by the Superintendent of the PIWD or their designated representative in these matters and shall be the only entity to negotiate any settlements. Deliveries must be made during normal working hours.
- B. Bid price is to include the cost of uncrating and setting in place where noted.
- C. Bid price is to include installation where noted.

## PART 4 - SITE ASSESSMENT

### 4.1 SITE EXAMINATION

- A. All general contractors (or Bidders), and major subcontractors are required to examine the project site before submitting a Bid.

### 4.2 PRE BID CONFERENCE

- A. A Pre Bid Conference has been scheduled for **10:00 am on July 25, 2022** at the Indian

Springs Well Site located off of Homestead Avenue, Prudence Island, RI.

- B. All general contract and subcontract Bidders are invited.
- C. Representatives of the Owner and Engineer will be in attendance.
- D. Information relevant to the Bid Documents will be recorded in an Addendum, if applicable, and issued to all known Bid Document recipients.

## PART 5 - QUALIFICATIONS

### 5.1 QUALIFICATIONS OF THE BIDDER

- A. The PIWD may make such investigations as deemed necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the PIWD all such information and data for this purpose as the PIWD may request.
- B. The PIWD reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner or the Engineer that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein.

### 5.2 SUBCONTRACTORS/SUPPLIERS/OTHERS

- A. The Owner or the Engineer reserves the right to reject a proposed Subcontractor for reasonable cause.
- B. Refer to Article 6.06 of EJCDC General Conditions.
- C. Subcontractor shall provide qualifications relevant to the work that they are performing.

## PART 6 - BID SUBMISSION

### 6.1 PREPARATION OF BID

- A. Each Bid must be submitted on the prescribed form. All blank spaces for Bid prices must be filled in ink or typewritten, both in words and figures. All Bids must be prepared in conformity with and shall be based on and submitted subject to all requirements of the Specifications and Drawings, together with all Addenda thereto.
- B. Erasures or other changes must be explained or noted over the signature of the Bidder.
- C. Each Bid must be submitted in sealed envelopes, clearly labeled, so as to guard against opening prior to the time set therefore.
- D. Supplemental information, drawings, warranties, literature and material to be provided with the Bid shall be on the Bidder's own form.

### 6.2 SUBMISSION OF BIDS

- A. Envelopes containing Bids must be sealed and marked with the name and address of the Bidder with the label “Bid Submission: Water System Chlorination & Pretreatment.” That envelope is to be placed inside another sealed enveloped which has been addressed as follows: Prudence Island Water District

P.O. Box 93  
Prudence Island, RI 02872  
Attention: Bid Proposal

- B. Any Bidder may withdraw his Bid by written request at any time prior to the advertised time for opening. Telephone bids, faxed bids, amendments or withdrawals will not be accepted.
- C. Unless otherwise specified, no Bid may be withdrawn for a period of sixty days (60) from the time of Bid opening.
- D. Negligence on the part of the Bidder in preparing the bid confers no rights for the withdrawal of the Bid after it has been opened.
- E. Proposals received prior to the time of opening will be securely kept, unopened. No responsibility will be attached to an officer or person for the premature opening of a proposal not properly addressed and identified.
- F. Any deviation from the Specifications MUST BE NOTED IN WRITING AND ATTACHED AS PART OF THE BID PROPOSAL. The Bidder shall indicate how the Bid will deviate from Specifications.

**PART 7 - BID ENCLOSURES/REQUIREMENTS**

**7.1 BID SECURITY**

- A. Each Bid proposal must be accompanied by Bid security (security deposit) in the form of a Bid Bond, payable to the PIWD, in the amount of 5% of the total amount Bid. Bid security of the successful Bidder will be retained by the PIWD until Bid requirements are met or forfeited to the PIWD upon Bidder's failure to perform contract obligations.
- B. Any successful Bidder withdrawing his Bid subsequent to Bid opening shall forfeit his Bid deposit.
- C. Include the cost of Bid Security in the Bid Price.
- D. Bid Bonds shall remain valid and in force for the entire Bid eligibility period (i.e., 60 days from Bid opening).

**7.2 AGREEMENT TO BOND**

- A. Submit with the Bid all surety requirements, provisions, and enclosures.

**7.3 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND**

- A. The successful Bidder will be required to furnish the PIWD with a Performance Bond and a Labor and Material Payment Bond, each in the amount of 100% of the contract price, as security for faithful performance of the Contract and executed by a surety company licensed to do business in the State of Rhode Island and approved by the PIWD.
- B. The failure of the successful Bidder to supply the required Bonds within a time specified or within such extended period as the PIWD may grant based upon reasons determined sufficient by the PIWD, shall constitute a default, and the PIWD may either award the contract to the next lowest Bidder or re-advertise for Bids.

#### 7.4 INSURANCE

- A. The Contractor shall assume responsibility and liability for all injuries to persons or damages to property, directly or indirectly due to, or arising out of, his operations under the contract and shall be responsible for the proper care and protection of all work performed until completion and final acceptance by the PIWD.
- B. The Contractor shall also indemnify and save harmless the PIWD against any and all claims of whatever kind and nature due to, or arising out of, his breach or failure to perform any of the terms, conditions, or covenants of the contract resulting from acceptance of his Bid.
- C. The Contractor shall furnish certificates of insurance from companies acceptable to the PIWD. All Insurance Companies listed on certificate must be licensed to do business in the State of Rhode Island. The Contractor shall provide a certificate of insurance as specified on the Bid proposal form. Contracts of insurance (covering all operations under this contract) shall be kept in force until the Contractor's work is accepted by the PIWD.
- D. The Contractor shall secure, pay for and maintain insurance as necessary to protect himself/herself against loss of owned or rented capital equipment and tools, with provision for waiver of subrogation against the Owner.
- E. The Contractor shall require a similar insurance in the above amounts to be taken out and maintained by each sub-contractor. The Contractor shall be fully responsible for the acts and omissions of its sub-contractors and of persons employed either directly or indirectly by them, as it is for the acts and omissions of persons directly employed by the Contractor. Nothing contained in the contract shall create any contractual relation between any sub-contractor and the PIWD.

#### 7.5 BID FORM REQUIREMENTS

- A. Complete all requested information in the Bid Form and Attachments.

#### 7.6 BID FORM SIGNATURE

- A. The Bid Form shall be signed by the Bidder, as follows:
  - 1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.

2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the Bid is signed by officials other than the President and Secretary of the company, or the President/Secretary/Treasurer of the company, a copy of the by-law resolution of the Board of Directors authorizing them to do so, must also be submitted with the Bid Form in the Bid envelope.
4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

#### 7.7 PREVAILING WAGE RATES

- A. Bid prices must reflect adherence to the provisions of State Labor Laws concerning payment of prevailing wages (see RI General Laws Sec. 37-13-1 et seq. as amended). The rates of pay set forth in these provisions are the minimums to be paid during the life of the contract. Bidders shall inform themselves as to the local labor conditions such as the length of workday and workweek, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of rates.

#### 7.8 TAX EXEMPTION

- A. Rhode Island Sales and Use Tax: Materials and equipment purchased for installation under this Contract are exempt from the Rhode Island Sales Tax. The exemption from the Sales Tax shall be taken into account by the CONTRACTOR during Bidding.
- B. Rhode Island Sales Tax: The PIWD is exempt from the payment of Rhode Island Sales Tax under the 1956 General Laws of the State of Rhode Island, 44-18-30 Paragraph 1, as amended.
- C. Federal Excise Taxes: The PIWD is exempt from the payment of any excise or federal transportation taxes. The price Bid must be exclusive of taxes and will be so construed.

#### 7.9 LABOR REGULATIONS

- A. The following paragraphs regarding labor regulations shall be included and become part of these Specifications:
  1. Non-resident Contractors are subject to Section 44-1-6 of the Rhode Island General Laws, as amended. (OUT OF STATE CONTRACTORS).
  2. The successful Bidder will be required to comply with the Contract Work Hours and Safety Standards Act (40 USC 327-330) as supplemented by Department of Labor Regulations (29 CFR, Part 5).
  3. The successful Bidder will be required to comply with the Safety and Health Regulations (29 CFR, Part 1926 and all subsequent amendments) as promulgated by the Department of Labor.
  4. The successful Bidder will be required to comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352).

- B. Bidders must, if required, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive award of the Contract.

#### 7.10 ADDITIONAL BID INFORMATION

- A. The Owner requires that the Bidders complete the Supplements to Bid Forms and Appendices identified in Section 00400 and attach with the submission of Bids.
  - 1. Appendix A - Subcontractors
  - 2. Appendix B - Qualifications of Bidder
  - 3. Appendix C - American Iron and Steel Requirements
  - 4. Appendix D - MBE Utilization Plan
  - 5. Appendix E - Utilization of Disadvantaged Business Enterprises
  - 6. Appendix F - Certification Regarding Debarment & Suspension
  - 7. Appendix G – Anti-Collusion Declaration

Failure to comply with these stipulations will be grounds for disallowing Bids at the Owner's or Engineer's discretion.

#### PART 8 - OFFER ACCEPTANCE/REJECTION

##### 8.1 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of sixty (60) days after the Bid closing date.

##### 8.2 WITHDRAWAL OF BIDS

- A. Bids may be withdrawn personally or by written request at anytime prior to the time specified for the opening. Bids may be modified in the same manner. Negligence on the part of the Bidder in preparing the Bid confers no right of withdrawal or modification of his Bid after such Bid has been opened.

##### 8.3 ACCEPTANCE OF OFFER

- A. The Owner reserves the right to accept or reject any or all offers.
- B. After acceptance by the Owner, the PIWD will issue to the successful Bidder, a written Bid Acceptance, letter of Contract Award, and Notice to Proceed.

#### PART 9 - LAWS, ORDINANCES, AND CODES

- A. All applicable Federal and State Laws, Ordinances and Codes of the Town of Portsmouth, and Regulations of all authorities having jurisdiction over this Project shall apply to this contract the same as though written herein in full.
- B. The PIWD will not award the Contract to any contractor who is, at the time, ineligible under the provisions of any applicable regulations issued by the Secretary of Labor, United States



Department of Labor, or is not qualified under applicable Ordinances of the Town of Portsmouth, or the laws of the State of Rhode Island. If the successful Bidder is a corporation NOT authorized to do business in the State of Rhode Island, it shall qualify to do business in the State of Rhode Island, immediately after the award of the contract.

- C. The successful bidder must provide proof of liability and worker's compensation insurance coverage in the aggregate minimum amount as specified herein. Such proof of insurance must specify the PIWD as additionally insured and as certificate holder.

#### PART 10 - TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. The Bidder must agree to commence Work on or before the date specified in the written Notice to Proceed of the Owner, and to substantially complete the Project within 300 consecutive calendar days. The Bidder must agree also to pay as liquidated damages, the sum of \$1,500 for each consecutive calendar day thereafter as hereinafter provided in the Contract and General Conditions.

#### PART 11 - PERMITS

- A. The Contractor shall obtain and pay for all other Permits as required by the Town of Portsmouth and the State (i.e., traffic control, etc.).

END OF SECTION

SECTION 00300

BID FORM

To: Prudence Island Water District  
PO Box 93  
Prudence Island, Rhode Island 02872

Project: Water System Chlorination & Pretreatment  
December 2021

Date:

Submitted by:  
(Full name)

\_\_\_\_\_  
(Full address)

1.00 OFFER

Having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by H2Olson Engineering, Inc., Engineer for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Price of:

\$

\_\_\_\_\_  
(Figures)

\_\_\_\_\_  
(Total price in words) dollars, in lawful money of the United States of America.

The Owner hereby reserves the right to reject any or all bids and to select the bid that best serves the interest of the Prudence Island Water District.

Attention is called to information contained in Section 01024 - Measurement and Payment, for information concerning Bid Items.

We have included herewith, the required security deposit, Bid Bond as required by the Instruction to Bidders.

2.00 EXPERIENCE/SUBMITTALS

- A. The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein.

- B. It is the intention of the Owner to obtain bids only from Contractors with experience in the construction of water treatment plants. To be considered for this project the successful bidder shall meet the following conditions:
1. The successful Bidder shall have an onsite construction supervisor with at least 10 years experience in the construction of water treatment plants.
  2. In addition to a skilled construction supervisor, all personnel utilized in significant roles in this project shall be properly trained and experienced in the tasks involved in the construction of infrastructure for potable water systems.
- C. Contractors shall submit with bid proposal the following, which shall become an integral part of the Bid Submission.
1. Section 00400 - Supplements to the Bid Form
    - Appendix A - Subcontractors
    - Appendix B - Qualifications of Bidder
    - Appendix C - American Iron and Steel Requirements
    - Appendix D - MBE Utilization Plan
    - Appendix E - Utilization of Disadvantaged Business Enterprises
    - Appendix F - Certification Regarding Debarment & Suspension
    - Appendix G – Anti-Collusion Declaration
- D. It shall be noted that the quantities on the bid form shall in no way constitute a minimum or maximum quantity to be expected. The Owner reserves the right to remove items from the bid and to add or subtract quantities from the bid after awarding of the contract has been completed
- E. Unbalanced bidding (i.e. “pennyning” of a bid item or items) shall not be allowed and may be cause for rejection of the bid, at the discretion of the Prudence Island Water District. Should the bidder believe that their bid prices provided in the bid form, constitute full compensation for each particular bid item, and the bid price for a particular bid item may be construed as an unbalanced bid, the bidder shall submit to the Engineer and Owner information supporting their proposed bid price for that particular bid item along with their bid. The submission of supporting documentation on bid items shall in no way constitute acceptance of that bid item as balanced. The Owner reserves the right to make the final determination of balanced or unbalanced bids.

3.00 SCHEDULE OF PRICES

The work of the General Bidder, being all work covered by items 1 through 2, inclusive.

ITEM NO.	ITEM DESCRIPTION AND UNIT PRICE (WORDS AND FIGURES)	ESTIMATED QUANTITY	EXTENDED TOTAL (FIGURES)
1	For the Water Treatment Plant and Appurtenant Work, including: building, foundation, greensand filtration system, chemical feed systems, backwash supply tank and pump, site work, site utilities, and all related equipment, HVAC, electrical, controls, piping, valves, devices, and appurtenances, the lump sum price of  Dollars (\$ ) lump sum	1	\$
2	For All Other Work Not Included in Item 1, inclusive, and not covered by the filed sub-bidders, the lump sum price of  Dollars (\$ ) lump sum	1	\$

Total amount of Bid  Dollars
(\$ )

4.00 ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for sixty (60) days from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within ten (10) days of receipt of Notice of Award.

Furnish the required bonds within ten (10) days of receipt of Notice of Award in the form described in Information to Bidders.

Commence work within ten (10) days after written Notice to Proceed.

If this Bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to the Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this Bid and the Bid upon which the Contract is signed.

In the event our Bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

5.00 CONTRACT TIME

If this Bid is accepted, the Bidder hereby agrees to commence WORK under this Contract on or before a date to be specified in the NOTICE TO PROCEED and to substantially complete the PROJECT within 300 calendar days.

6.00 RETAINAGE

If this bid is accepted, the retainage shall be an amount equal to 5% of completed Work until substantial completion is issued. At substantial completion, or any time thereafter when the progress of the Work, in the opinion of the ENGINEER is not satisfactory, additional amounts may be retained, but in no event shall the total retainage be more than stated in Section 00500 Article 6. Upon satisfactory completion of the Work, any amount retained will be paid to the CONTRACTOR.

7.00 ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum # \_\_\_\_\_ Dated

Addendum # \_\_\_\_\_ Dated

Addendum # \_\_\_\_\_ Dated

Addendum # \_\_\_\_\_ Dated

8.00 APPENDICES

Submit Documents 00400 - Supplements to Bid Forms with Bid Submission.

9.00 BID FORM SIGNATURE(S)

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The Corporate Seal of (Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

was hereunto affixed in the presence of:

---

(Authorized signing officer

Title)

(Seal)

---

(Authorized signing officer

Title)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, \_\_\_\_\_, as Principal, and \_\_\_\_\_, as Surety, are hereby held and firmly bound unto the Prudence Island Water District, acting through its Chairman hereinafter called the Owner in the penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), for the payment of which will and truly be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed this \_\_\_\_\_ day of 2022.

THE CONDITION OF THE ABOVE OBLIGATION is such that whereas the Principal has submitted to the Prudence Island Water District, a certain bid attached hereto and hereby made a part hereof to enter into a contract in writing for:

WATER SYSTEM CHLORINATION & PRETREATMENT  
PRUDENCE ISLAND, RHODE ISLAND

NOW THEREFORE,

- If said bill shall be rejected or in the alternate:
- If said bill shall be accepted and the principal shall execute and deliver a contract in the form of contract attached hereto (properly completed in accordance with said bid) and shall furnish a bond for his faithful performance of said contract and for the payment of all persons performing labor and furnishing materials in connection therewith and shall in all other respects perform the agreement created by the acceptance of said bid, then his obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

• The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall in no way be impaired or affected by any extension of the time within which the Owner may accept such bid; and said Surety does hereby waive notice of any extension.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

By \_\_\_\_\_ SEAL  
(Principal)

By \_\_\_\_\_ SEAL  
(Surety)

END OF SECTION

SECTION 00400

SUPPLEMENT TO BID FORM

To: Prudence Island Water District  
P.O. Box 93  
Prudence Island, Rhode Island 02872

Project: Water System Chlorination & Pretreatment  
December 2021

Date: \_\_\_\_\_

Submitted by:

\_\_\_\_\_  
(full name)

\_\_\_\_\_  
(full address)

In accordance with Document 00100 - Instructions to Bidders, and Document 00300 - Bid Form, we include the Supplements to Bid Form appendices listed below. The information provided shall be considered an integral part of the Bid Form. These appendices are as follows:

- Appendix A: Subcontractors: Include the names of all subcontractors, including qualifications and experience and the portions of the work they will perform.
- Appendix B: Qualifications of Bidder
- Appendix C: American Iron and Steel Requirements
- Appendix D: MBE Utilization Plan
- Appendix E: Utilization of Disadvantaged Business Enterprises
- Appendix F: Certification Regarding Debarment & Suspension
- Appendix G: Anti-Collusion Certification



APPENDIX A - Subcontractors

Herewith is the list of Subcontractors referenced in the Bid submitted by:

\_\_\_\_\_  
(Bidder)

Prudence Island Water District  
\_\_\_\_\_  
(Owner)

dated \_\_\_\_\_ and, which is an integral part of the Bid Form.

The following work will be performed (or provided) by the following Subcontractors, and coordinated by us:

SECTION OF WORK

NAME

SECTION OF WORK	NAME
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
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_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Attach a listing of relevant qualifications and experience on similar projects.

Contractor shall be able to demonstrate that they have a minimum of five (5) years of experience in relevant water main installation work.

APPENDIX B - Qualifications of Bidder

- a) List additional Relevant Experience of firm bidding the project as it relates to projects of similar nature and complexities as that proposed by the Prudence Island Water District. Include: project time frame, contact personnel, description, bid cost, final project cost (minimum 3 projects).
- b) List all equipment that will be dedicated to this project. The successful bidder will be required to dedicate the listed equipment to this project for the duration of work. No removal or substitutions of equipment will be allowed without the express written consent of the Prudence Island Water District. Failure to abide by this requirement shall be cause for termination of the Contract by the Prudence Island Water District.
- c) List all personnel, in particular the Project Manager(s), Project Superintendent(s), and Foreman(s), who shall be directly involved and responsible for this project. The bidder also shall provide the relevant experience of those listed. The relevant experience shall be in the installation of new potable water pump stations and chlorine feed equipment. The successful bidder shall be required to dedicate the listed personnel to this project for the duration of work. No removal or substitution of personnel shall be allowed without the express written consent of the Prudence Island Water District. Failure to abide by this requirement shall be cause for termination of the Contract by the Prudence Island Water District.

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Include additional sheets if necessary.

APPENDIX C – American Iron and Steel Requirements

AMERICAN IRON AND STEEL REQUIREMENTS

The Contractor acknowledges to and for the benefit of the Prudence Island Water District (Purchaser”) and the State of Rhode Island (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as “American Iron and Steel;” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contactor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products 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 Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State 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 State. This bidder certifies that the requirements of the P.L. 113-76 “Consolidated Appropriations Act, 2014” will be satisfied:

Date \_\_\_\_\_

Bidder

\_\_\_\_\_  
(Name of Bidder)

By \_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Business Address)

\_\_\_\_\_  
(City and State)

APPENDIX D – MBE Utilization Plan

**STATE OF RHODE ISLAND AND  
PROVIDENCE PLANTATIONS  
Minority Business Enterprise Compliance Office  
Minority Business Enterprise Utilization Plan**

Company Name: \_\_\_\_\_

Representative’s Name who administers MBE Program: \_\_\_\_\_

Street Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_ Telephone: \_\_\_\_\_

Email: \_\_\_\_\_ Project Location: \_\_\_\_\_

Bid or Project #: \_\_\_\_\_ Date Bid Opened: \_\_\_\_\_

Description of Work: \_\_\_\_\_

Contract Value: \_\_\_\_\_ MBE % Assigned: \_\_\_\_\_

Total # of Subcontractors/Suppliers used: \_\_\_\_\_ #

of MBE Subcontractors/Suppliers used: \_\_\_\_\_

**List All Subcontractors/Suppliers – Total Dollar Amounts – Scope of Work:**

<b>Subcontractor / Supplier</b>	<b>Dollar Award</b>	<b>Scope/Description of Work</b>	<b>RI Certified MBE</b>

*Note: Dollar value of work must be performed by Minority Business Enterprises certified by the Rhode Island Department of Administration. Contractor may count towards it MBE goal 60% of expenditures for material and supplies required under a contract and obtained from a **MBE regular dealer/supplier**, and 100% of such expenditures when obtained from a MBE Manufacturer.*

The above referenced contract will not be released until this plan has been approved by the Director of the Department of Administration or its designee.

For assistance and advice in identifying MBE firms, please call the Minority Business Enterprise Compliance Office at 401-574-8670 (Note: MBE Listing are available at [www.mbe.ri.gov](http://www.mbe.ri.gov)).

Signature of Authorized Agent of Business: \_\_\_\_\_ Date: \_\_\_\_\_

**Send Completed Form to:    Minority Business Enterprise Compliance Office**  
**Department of**  
**Administration One**  
**Capitol Hill - 2<sup>nd</sup>**  
**Floor Providence,**  
**RI 02908**  
**Phone: 401-574-8670**  
**Fax: 401-574-8387**  
**Web site: [www.mbe.ri.gov](http://www.mbe.ri.gov)**

APPENDIX E – Utilization of Disadvantaged Business Enterprises

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
UTILIZATION OF DISADVANTAGED BUSINESS ENTERPRISES

This project is subject to the Environmental Protection Agency's requirements for Disadvantaged Business Enterprise (DBE).

The Bidder, as part of the Bid, must submit the following completed EPA Disadvantaged Business Enterprise Forms (attached to this Specification Section):

- **EPA Form 6100-3: DBE Program Subcontractor Performance Form**
- **EPA Form 6100-4: DBE Program Subcontractor Utilization Form**

EPA Form 6100-3 must be completed for each Subcontractor.

Upon completion of the Contract, the Contractor shall provide the following EPA Disadvantaged Business Enterprise Form (also attached to this Specification Section) to the DBE Subcontractor(s) for submittal to the EPA DBE Coordinator:

- **EPA Form 6100-2: DBE Program Subcontractor Participation Form**

EPA Region 1 DBE Program Coordinator Contact Information:

Larry Wells  
(617) 918-1836  
[wells.larry@epa.gov](mailto:wells.larry@epa.gov)

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

This form is intended to capture the DBE<sup>1</sup> subcontractor's<sup>2</sup> 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: <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/ exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown

<sup>1</sup> 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.

<sup>2</sup> 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).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

<b>Subcontractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

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 DBE<sup>1</sup> subcontractors<sup>2</sup> 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 \_\_\_\_\_

<sup>1</sup> 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.

<sup>2</sup> 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).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

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.

APPENDIX F – Certification Regarding Debarment & Suspension

**CERTIFICATION REGARDING DEBARMENT & SUSPENSION  
AND OTHER RESPONSIBILITY MATTERS**

In accordance with the Executive Order 12549, the prospective primary participant certifies to the best of his / her knowledge and belief, that its principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or agency;
- b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offence in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state, or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification.
- d. Have not within a three-year period preceding this application/proposal had one or more public transactions (federal, state, or local) terminated for cause of default.
- e. Acknowledge that all sub-contractors selected for this project must be in compliance with paragraphs (1) (a – d) of this certification.

\_\_\_\_\_  
Name and Title of Authorized Agent

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Authorized Agent

\_\_\_\_\_ I am unable to certify to the above statements. My explanation is attached.

APPENDIX G – Anti-Collusion Declaration

**PRUDENCE ISLAND WATER DISTRICT (OWNER)  
WATER SYSTEM CHLORINATION & PRETREATMENT PROJECT  
ANTI-COLLUSION DECLARATION**

The undersigned, as bidder, having fully informed himself regarding the accuracy of the statements made herein, certifies that:

1. No person or persons other than those named herein are interested in this Bid (Proposal), and that this bid has been made without collusion with any other person, firm or corporation;
2. No person or persons acting in any official capacity for the Owner is/are directly or indirectly interested in the proposed work or any portion of the profit thereof; and
3. The contents of the Bid have not been communicated by the bidder or his employees or agents to any person not an employee or agent of the bidder or his surety on any bond furnished with the Bid, and will not be communicated to any such person or persons prior to the official opening of the Bid.

The undersigned bidder further certifies that this statement is executed for the purposes of inducing the Prudence Island Water District to consider the bid and make an award in accordance therewith.

\_\_\_\_\_  
(Legal Name of Bidder)

\_\_\_\_\_  
(Business Address)

\_\_\_\_\_  
(Signature and Title of Authorized Signer)

\_\_\_\_\_  
(Date)

SECTION 00500

FORM OF AGREEMENT

**EJCDC  
FORM OF AGREEMENT  
BETWEEN OWNER AND CONTRACTOR FOR  
CONSTRUCTION CONTRACT (STIPULATED PRICE)  
FUNDING AGENCY EDITION**

THIS AGREEMENT is by and between Prudence Island Water District (Owner)

and \_\_\_\_\_ (Contractor).

Owner and Contractor, in consideration of the mutual covenants set forth herein, 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:

In general and without limitation, the work to be done under this contract includes the construction of a drinking water treatment plant including but not limited to furnishing and installing; precast concrete building and foundation; site preparation, grading, and restoration; yard piping, fittings, valves, hydrant, and appurtenances; infiltration basin; a packaged greensand pressure filtration system; backwash supply tank and pump; process piping and valves; pumps; chemical feed systems; instrumentation and controls; facility HVAC and electrical; start-up and performance testing.

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:

The Project consists of the installation of a new greensand water treatment plant and chlorination at the Indian Springs well site in addition to chlorination at the Army Cap well site located on Prudence Island in Rhode Island.

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by H2Olson Engineering, Inc., who 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 will be substantially completed within 300 consecutive calendar days from issuance of a Notice to Proceed.

#### 4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence 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 \$1,500.00 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete.

### ARTICLE 5 - CONTRACT PRICE

- A. For all Work, at the prices stated in the Contractor's Bid, included in Document 00300 Bid Form.

### 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.

B. Each application for payment shall be accompanied by an Updated Cash Flow Projection, estimating the future monthly payments to the Contractor for the remainder of the project.

#### 6.02 Progress Payments; Retainage

A. Owner shall make monthly progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment, which shall be submitted to the Owner on the 1st work day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. 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:

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 percent of Work completed (with the balance being retainage); and
- b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions.

3. Owner will make no further payments to Contractor for a period of one year following such time as Contractor, in the opinion of Engineer, has satisfactorily completed all corrections identified in 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 of the General Conditions), and other documents.

### 6.03 Final Payment

A. Upon receipt of the final Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay Contractor as provided in Paragraph 14.07 of the General Conditions the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages.

### ARTICLE 7 – INTEREST - Omitted

### 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 obtained and carefully studied (or assumes responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of 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 Bidding Documents, and safety precautions and programs incident thereto.

E. 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.

F. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

G. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with 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 61, inclusive).
3. Supplementary Conditions (pages 1 to 8, inclusive)
4. Technical Specifications as listed in the table of contents of the Specifications.
5. Drawings consisting of 27 sheets bearing the following general title: Water System Chlorination & Pretreatment, Prudence Island, RI.
6. Addenda (numbers        to        , inclusive).
7. Exhibits to this Agreement (enumerated as follows):
  - a. Notice of Award (pages 1 to 1, inclusive).
  - b. Contractor's Bid (pages 1 to 9, inclusive).
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 1 to 1, inclusive).
  - b. Application for Payment
  - c. Work Change Directives.
  - d. Change Order(s).
  - e. Certificate of Substantial Completion
  - f. Waiver of Liens



g. Certificate of Final Payment and Completion of Work

h. Transfer of Title

- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. 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 will have the meanings stated in the General Conditions and the Supplementary Conditions.

### 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 provision that comes as close as possible to expressing the intention of the stricken provision. IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in four copies. One counterpart each has been delivered to Owner, Contractor, Engineer, and Agency. All portions of the Contract Documents have been signed, initialed, or identified by Owner and Contractor or identified by Engineer on their behalf.

This Agreement will be effective \_\_\_\_\_, \_\_\_\_ (which is the Effective Date of the Agreement). This Agreement shall not be effective unless and until Agency's designated representative concurs.

OWNER:

CONTRACTOR:

Prudence Island Water District \_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest : \_\_\_\_\_

Attest : \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Designated Representatives:

Designated Representatives:

Name : \_\_\_\_\_

Name : \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address for giving notices:

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_ FAX : \_\_\_\_\_

Phone \_\_\_\_\_ FAX : \_\_\_\_\_

(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.)

License No.: \_\_\_\_\_ (Where applicable)

END OF SECTION

SECTION 00550

NOTICES

**NOTICE OF AWARD**

TO: \_\_\_\_\_

**PROJECT DESCRIPTION: Water System Chlorination & Pretreatment, Prudence Island, RI**

The Owner has considered the Proposal submitted by you for the above described Work on \_\_\_\_\_ in response to its Advertisement for Bids and Instructions to Bidders.

You are hereby notified that your Proposal has been accepted for Items totaling the amount of \$\_\_\_\_\_.

You are required by the Instructions to Bidders to execute the Contract Agreement and furnish the required Contractor's Performance Bond, Payment Bond and certificates of insurance within ten (10) days from the date of this Notice of Award.

If you fail to execute said Agreement and to furnish said Bonds and Insurance within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Proposal as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner. Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2022.

By the Prudence Island Water District:

By: \_\_\_\_\_

Title: \_\_\_\_\_ Date \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

Receipt of the above Notice of Award is hereby acknowledged, this, the day of \_\_\_\_\_, 2022.

By: \_\_\_\_\_

Title: \_\_\_\_\_

**NOTICE TO PROCEED**

To: \_\_\_\_\_

Date: \_\_\_\_\_

**PROJECT: Water System Chlorination & Pretreatment, Prudence Island, RI**

You are hereby notified to commence the Work in accordance with the Agreement dated \_\_\_\_\_, on or before \_\_\_\_\_, and you are to complete all work within **Three Hundred (300) consecutive calendar days** thereafter. The date of completion of all work is, therefore, \_\_\_\_\_.

**Prudence Island Water District**

By: \_\_\_\_\_

Title: \_\_\_\_\_

DOCUMENT 00610

PERFORMANCE BOND

**KNOW ALL MEN BY THESE PRESENTS,**

That we, \_\_\_\_\_, organized under the laws of the State of \_\_\_\_\_, and having a usual place of business in \_\_\_\_\_, as principal, and \_\_\_\_\_ organized under the laws of the State of \_\_\_\_\_ and having a usual place of business in \_\_\_\_\_, as surety, are holden and stand firmly bound and obligated unto the Prudence island water District as obligee, in the sum of \_\_\_\_\_ (\$ \_\_\_\_\_) Dollars, lawful money of the United States of America, to and for the true payment whereof, we hereby bind ourselves, and each of us, our heirs, administrators, successors, and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, the said principal has, by means of a written agreement, dated \_\_\_\_\_, entered into a contract with the said obligee for the **Water System Chlorination & Pretreatment, Prudence Island, RI** a copy of which agreement is attached hereto and by reference made a part hereof.

**NOW, THEREFORE**, the conditions of this obligation is such that if the said principal shall well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of said contract on his part to be kept and performed, during the original term of said contract and any extensions thereof that may be granted by the Prudence Island Water District with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of any and all duly authorized modifications, alterations, changes or additions to said contract that may hereafter be made, notice to the surety of such modifications, alterations, changes or additions being hereby waived, then this obligation shall be null and void; otherwise it shall be and remain in full force, virtue and effect.

In the event that the work under said contract is abandoned by the principal or is terminated by the Prudence Island Water District under the provisions of Sections of said Contract, said surety hereby

further agrees that said surety shall, if requested in writing by the Prudence Island Water District take such action as is necessary to complete the work under said contract.

And the said surety, for value received, hereby stipulates and agrees that no change in, or extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder, or to the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the Specifications.

**IN WITNESS WHEREOF**, we have hereunto set our hands and seals this \_\_\_\_ day of \_\_\_\_  
\_\_\_\_\_ in the year Two Thousand and Twenty-Two.

Important: Attach herewith proof of authority of officers or agents to sign Bond.

**Principal:**

**Surety:**

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

(Title) \_\_\_\_\_

(Title) \_\_\_\_\_

(SEAL)

(SEAL)

\_\_\_\_\_

Address

\_\_\_\_\_

Telephone Number

\_\_\_\_\_

\_\_\_\_\_

Fax Number

END OF SECTION

DOCUMENT 00620

PAYMENT BOND

**KNOW ALL MEN BY THESE PRESENTS,**

That we, \_\_\_\_\_ organized under the laws of the State of \_\_\_\_\_ and having a usual place of business in \_\_\_\_\_, as principal, and \_\_\_\_\_ organized under the laws of the State of \_\_\_\_\_ and having a usual place of business in \_\_\_\_\_, as surety, are holden and stand firmly bound unto the Prudence Island Water District as obligee, in the sum of \_\_\_\_\_ (\$ \_\_\_\_\_) Dollars lawful money of the United States of America, to and for the true payment whereof, we hereby bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, the said principal has, by means of a written agreement, dated \_\_\_\_\_ entered into a contract with the said obligee for the **Water System Chlorination & Pretreatment, Prudence Island, RI**, a copy of which agreement is attached hereto and by reference made a part hereof.

**NOW THEREFORE**, The conditions of this obligation is such that if the principal shall pay for all labor performed or furnished and for all materials used or employed in said contract and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said contract that may hereafter be made, notice to the surety of such modifications, alterations, extensions of time, changes or additions being hereby waived, then this obligation shall be null and void; otherwise it shall be and remain in full force, virtue and effect.

**IN WITNESS WHEREOF**, the above-bounded parties have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_ in the year Two Thousand and Twenty-Two.

Important: Attach herewith proof of authority of officers or agents to sign Bond.

**Principal:**

**Surety:**

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

By: \_\_\_\_\_

(Title) \_\_\_\_\_

(Title) \_\_\_\_\_

(SEAL)

(SEAL)

\_\_\_\_\_

Address

\_\_\_\_\_

Telephone Number

\_\_\_\_\_

Fax Number

END OF SECTION



# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

**ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE**

and

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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.

SECTION 00800

SUPPLEMENTARY CONDITIONS

PART 1 AMENDMENTS TO GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition) and other provisions of the Contract Documents as indicated below. 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 below, which are applicable to both the singular and plural thereof.

The address system used in the Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC-1.01 Delete paragraph 1.01A.42 in its entirety and insert the following in its place:

42. Specifications – Sections included under Division 1 through Division 16.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01B Delete paragraph 2.01B in its entirety and insert the following in its place:

2.01B Evidence of Insurance: Within 15 days from the date of the Notice of Award, Contractor shall deliver to Owner, with a copy to Engineer, certificates of insurance (and other evidence requested by Owner) which Contractor is required to purchase and maintain in accordance with the requirements of Article 5.

SC-2.03A Delete paragraph 2.03A in its entirety and insert the following in its place:

2.03A Contract Time will commence to run on the date specified in the Notice to Proceed.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01B Add the following new paragraph immediately after paragraph 3.01B:

3.01B.1 Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.06A.1 The Storage Tank Condition Assessment Report, dated August 26, 2019, which describes the existing costing system of the tank is attached as part of these Specifications.

ARTICLE 5 - BONDS AND INSURANCE

SC-5.02A Add the following at the end of paragraph 5.02A:

Surety and insurance companies shall be rated A- or higher by A. M. Best at the time of contract award.

SC-5.03B Add the following new paragraph immediately after paragraph 5.03E:

5.03F Insurance certificate(s) shall also contain the following:

1. Confirmation regarding whether the General Liability policy covers all of the Contractor's operations or only the Work under this Contract, with project specific limits.
2. Confirmation that the General Liability policy includes XCU coverage.
3. Confirmation that automobile insurance covers all Scheduled, Hired and Non-Owned vehicles.
4. Names of all additional insureds as specified herein.

SC-5.04B Add the following new paragraphs immediately after paragraph 5.04B

5.04C The limits of liability for the insurance required by paragraph 5.04 shall provide coverage for not less than the following amounts or greater where required by law:

1. Worker's Compensation and Employer's Liability as required by law.
2. Contractor's General Liability under paragraphs 5.04A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages:

- |    |   |             |
|----|---|-------------|
| a. | General Aggregate   | \$2,000,000 |
| b. | Products/Completed Operations Aggregate   | \$2,000,000 |
| c. | Personal and Advertising Injury   | \$1,000,000 |
| d. | Each Occurrence (Bodily Injury and Property Damage)   | \$1,000,000 |
| e. | Damage to Rented Premises   | \$1,000,000 |
| f. | Excess or Umbrella Liability, which may be used to satisfy the limits of liability required for the insurance to be purchased and maintained in |             |

accordance with paragraph  
5.04

- 1) General Aggregate \$5,000,000
- 2) Each Occurrence \$5,000,000

3. Comprehensive Automobile Liability under paragraph 5.04A.6 of the General Conditions including all scheduled, hired and non-owned vehicles:

- a. Bodily Injury :
  - Each Person \$1,000,000
  - Each Accident \$1,000,000
- b. Property Damage:
  - Each Accident \$1,000,000

4. The following shall be included on the policy and identified on the certificate as additional insureds:

- a. H2Olson Engineering, Inc.  
10 Riverside Drive, Suite 103  
Lakeville, Massachusetts 02347
- b. Prudence Island Water District  
PO Box 93  
Prudence Island, RI 02872

5.04D CONTRACTORS POLLUTION LIABILITY COVERAGE: The limit of liability should be \$1,000,000.00 per occurrence with \$2,000,000.00 aggregate. Coverage shall be provided for bodily injury, property, damage and clean-up cost for all pollution related exposures. Any deductible or retention shall be the responsibility of the Contractor. The pollution coverage shall apply on an "occurrence basis" and include additional insured status for the Designated Parties. The additional insure status provided will be on a primary and non-contributing basis and will also include coverage for both ongoing and completed operations.

SC-5.05 Delete paragraph 5.05 in its entirety and insert the following in its place:

5.05 Contractor has the option to carry liability insurance for the Owner in accordance with either 5.05.A or 5.05.B described below:

5.05.A The Contractor shall purchase and maintain a separate Owner's Protective Liability policy, issued to Owner at the expense of Contractor, including Owner and Engineer as named insured. This insurance shall provide coverage for not less than the following amounts:

Bodily Injury	\$1,000,000	Each Occurrence
Property Damage	\$1,000,000	Each Occurrence
	\$2,000,000	Aggregate

5.05.B In lieu of a separate Owner's Protective Liability policy, the Contractor shall include the following endorsements:

CG 2026 0704 – Additional Insured  
CG 2010 0704 – Additional Insured - Owners Lessors or Contractors  
CG 2037 0704 – Owners, Lessors and Contractors Completed Operations

SC-5.06 Delete the first sentence of paragraph 5.06.A and replace with the following:

Contractor shall purchase and maintain property insurance upon the Work at the Site, in the amount of the full replacement cost thereof. Contractor shall be responsible for any deductible or self-insured retention.

SC-5.06A Add the following new paragraph immediately after paragraph 5.06A.7:

5.06A.8. comply with the requirements of paragraph 5.06C. of the General Conditions.

SC-5.06 Delete paragraph 5.06B in its entirety.

SC-5.06 Delete paragraph 5.06 in its entirety.

SC-5.08 Delete paragraph 5.08 in its entirety.

## ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

SC-6.01B Add the following new paragraph immediately after paragraph 6.01B.

6.01C Whenever Owner shall notify Contractor in writing that any person on the Work appears to be incompetent, disorderly, or otherwise unsatisfactory, such person shall be removed from the Project and shall not again be employed on it except with the consent of Owner.

SC-6.06 Delete paragraphs 6.06A and 6.06B in their entirety and insert the following in their place.

6.06A Contractor shall not employ any Subcontractor, Supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom

Owner may have reasonable objection. Acceptance of any Subcontractor, other person or organization by Owner shall not constitute a waiver of any right of Owner to reject defective Work. Contractor shall not be required to employ any Subcontractor, other person or organization against whom Contractor has reasonable objection.

SC-6.06C Add the following new paragraph immediately after paragraph 6.06C.2:

6.06C.3 Owner or Engineer may furnish to any such Subcontractor, Supplier or other person or organization, to the extent practicable, information about amounts paid on their behalf to Contractor in accordance with Contractor's Applications for Payment.

SC-6.07B Delete paragraph 6.07B in its entirety.

SC-6.08A Delete the word "Owner" in the last sentence of Paragraph 6.08A and replace with the word "Contractor."

SC-6.17 Add the following new paragraphs immediately after paragraph 6.17E:

F. 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.

G. 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 the Contractor.

SC-6.20C Add the following new paragraph immediately after paragraph 6.20.C.

6.20D If, through acts of neglect on the part of Contractor, any other Contractor or any Subcontractor shall suffer loss or damage on the Work, Contractor shall settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractor will so settle. If such other Contractor or Subcontractor shall assert any claim against Owner on account of any such damage alleged to have been sustained, Owner shall notify Contractor, who shall indemnify, defend, and save harmless Owner against any such claim.

## ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

SC-10.05 Amend the first sentence of paragraph 10.05B by replacing "30 days" with "15 days".

Amend the third sentence of paragraph 10.05B by replacing "60 days" with "30 days".

## ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

SC-11.01A.1 Delete the word "superintendents" in the second sentence after the word "limitation."

SC-11.01 Delete paragraph 11.01A.5.c in its entirety and replace with the following:



11.01A.5.c The fair rental of all machinery and equipment used on the extra work for the period of such use. The fair rental for all machinery and equipment shall be based upon the most recent edition of “Rental Rate Bluebook for Construction Equipment” (the “Bluebook”), published by Nielson/Dataquest, or a similar publication approved by Engineer. Rental periods corresponding to the overall period of use shall be used, except if a piece of equipment used on extra work is already on the job, or has previously been rented for a long period of time (months), then the long-term rental rate (monthly) shall be used in determining costs.

SC-11.01B.1 Insert in the first sentence after the word “architects” the word “superintendents”.

SC-11.01B.5 Add the following new paragraph immediately after paragraph 11.01B.5:

11.01B.6 Costs of or rental of small tools; costs of or rental of buildings.

#### ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-13.03 Insert after the word “notice” the words “(minimum 24 hours)” in paragraph 13.03A.

SC-13.04 Insert in the first sentence of paragraph 13.04B after the word “others” the words “following prior written concurrence of Engineer to cover such work”.

SC-13.05 Add the following new paragraph immediately after paragraph 13.05A.

13.05B If Owner stops work under Paragraph 13.05, Contractor shall not be entitled to an extension of Contract Time nor to an increase in Contract Price.

SC-13.06 Add the following new paragraph immediately after Paragraph 13.06B.

13.06C At any time during the progress of the Work, Engineer shall have the right to reject any work which does not conform to the requirements of the Contract Documents, even though such work has been previously inspected and paid for.

#### ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02 Delete the first sentence of paragraph 14.02A.1 and replace with the following:

14.02A.1 Engineer will, once in each month, make an estimate in writing of the total value of the work completed as of the date of the Application. Engineer shall review the Application with Contractor and Contractor shall sign the Application.

SC-14.02 Add the following new paragraph immediately after paragraph 14.02B.5.d.

14.02B.5.e Owner is required to pay Engineer additional compensation because of Contractor delays or rejection of defective Work.

SC-14.04 Delete paragraphs 14.04A through 14.04D in their entirety and insert the following in its place:

14.04A 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. Within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of the Work to determine the status of completion. If, after consultation with Owner, Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor. If, after consultation with Owner, Engineer considers and the Owner agrees that the Work is substantially complete, Engineer will prepare and deliver to Contractor, in a form approved by Owner, a Certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be included in the certificate a list of items to be completed or corrected before final payment.

SC-14.05 Add the following new paragraph immediately after paragraph 14.05A.3:

14.05.A.4 Owner may at any time request Contractor in writing to permit Owner to take over operation of any part of the Work although it is not substantially complete. A copy of such request will be sent to Engineer, and within a reasonable time thereafter Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If Contractor does not object in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the list of items to be completed or corrected and will deliver such lists to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties, and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

Paragraph 14.05.A.4 shall be renumbered to 14.05.A.5

SC-14.07 Delete paragraphs 14.07.B. and 14.07.C in their entirety and insert the following in their place:

14.07.B 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, all 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 indicate in writing his/her recommendation of payment and present the Application to Owner for payment. Thereupon Engineer will 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 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. If the Application and accompanying documentation are appropriate as to form and substance, Owner shall in accordance with the applicable Law, pay Contractor the amount recommended by Engineer.

#### ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

SC- 15.02 Add the following new paragraph immediately after paragraph 15.02.A.4:

15.02.A.5. If Contractor abandons the Work, or sublets this Contract or any part thereof, without the previous written consent of Owner, or if the Contract or any claim thereunder shall be assigned by Contractor otherwise than as herein specified.

#### ARTICLE 16 - DISPUTE RESOLUTION

SC-16.01 Delete paragraph 16.01 in its entirety and insert the following in its place:

16.01.A Subject to the provisions of paragraphs 9.08 and 10.05, Owner and Contractor may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

END OF SECTION

SECTION 00820 INDEX

- A. Drinking Water State Revolving Fund Program – Relevant Federal and State Laws (45 pages)
- B. EPA Disadvantaged Business Enterprise (DBE) Program – DBE Forms (6 pages)
- C. Good Faith Efforts to achieve MBE participation (2 pages)
- D. State of Rhode Island Minority Business Enterprise (MBE) Utilization Plan (1 page)
- E. State of Rhode Island Minority Business Enterprise (MBE) Project Reporting Form (1 page)
- F. State Revolving Fund Sign (3 pages)
- G. Davis Bacon Wage Rates/Questionnaire (23 pages)
- H. Debarment & Suspension (Executive Order 12549) and Certification (3 pages)
- I. EPA American Iron and Steel Memorandum (20 pages)
- J. EPA Memo: Prohibition on Certain Telecommunications and Video Surveillance (2 pages)



## Rhode Island Department of Health Center for Drinking Water Quality

### Drinking Water State Revolving Fund Program Relevant Federal and State Laws

#### A. Federal

- 1) Equal Employment Opportunity and Affirmative Action (Executive Order 11246)
  - i) OFCCP fact sheet.
  - ii) Equal Opportunity Clause and the Standard Federal Equal Employment Specifications.
  - iii) Notice of Non-Discrimination in Employment.
- 2) Non-discrimination in employment notice.
- 3) Assurance of compliance with Title VI of the Civil Rights Act of 1964 and Section 13 of the FWPCA Amendments of 1972 (EPA form 4700-1).
- 4) Affirmative steps for soliciting MBE/WBE (40 CFR 31.36(e))

Applicable cross-cutting Federal authorities for projects funded through SRF programs are made available at [http://water.epa.gov/grants\\_funding/dwsrf/xcuts.cfm](http://water.epa.gov/grants_funding/dwsrf/xcuts.cfm). Additional information is provided in the United States Environmental Protection Agency's cross-cutting handbook available at <https://www.epa.gov/sites/production/files/2015-08/documents/crosscutterhandbook.pdf>.

#### B. State of Rhode Island

- 1) RIGL 37-2.1, Domestic Steel
- 2) RIGL 37-12, Contractors Bonds
- 3) RIGL 37-12.1, Substitution of Security for Retained Earnings of Architects and Engineers.
- 4) RIGL 37-13, Labor and Payment of Debts by Contractors
  - i) Prevailing Wage Rates
- 5) RIGL 37-14.1, Minority Business Enterprise
  - i) Regulations Governing Participation by Minority Business Enterprises in State Funded and Directed Public Construction Projects, Construction Contracts and Procurement Contracts Goods and Services.
- 6) RIGL 37-16, Public Works Arbitration
- 7) RIGL 45-55, Award of Municipal Contracts

**NOTE:** This package is prepared by DOH as a service of the DWSRF program. While every attempt at accuracy has been made, these are not certified true copies of the laws presented. **The responsibility for compliance with all applicable provisions of Federal and State laws and regulations relating to the bidding, award, and performance of contracts is the applicant's and the bidder's.** Certified true and complete copies of any Rhode Island laws and regulations may be obtained from the Office of the Secretary of State.

# Employment Standards Administration Office of Federal Contract Compliance Programs

## Fact Sheet EXECUTIVE ORDER 11246

EEO and Affirmative Action Guidelines for Federal Contractors Regarding Race, Color, Gender, Religion, and National Origin.

### **BASIC PROVISIONS**

Since 1965, the U.S. Department of Labor's Office of Federal Contract Compliance Programs (OFCCP) has been committed to ensuring that Government contractors comply with the equal employment opportunity (EEO) and the affirmative action provisions of their contracts.

OFCCP administers and enforces Executive Order 11246, as amended, which prohibits federal contractors and federally-assisted construction contractors and subcontractors, who do over \$10,000 in Government business in one year from discriminating in employment decisions on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin.

The Executive Order also requires Government contractors to take affirmative action to insure that equal opportunity is provided in all aspects of their employment.

### **AFFIRMATIVE ACTION REQUIREMENTS**

Each Government contractor with 50 or more employees and \$50,000 or more in government contracts is required to develop a written affirmative action program (AAP) for each of its establishments.

A written affirmative action program helps the contractor identify and analyze potential problems in the participation and utilization of women and minorities in the contractor's workforce.

If there are problems, the contractor will specify in its AAP the specific procedures it will follow and the good faith efforts it will make to provide equal employment opportunity.

Expanded efforts in outreach, recruitment, training and other areas are some of the affirmative steps contractors can take to help members of the protected groups compete for jobs on equal footing with other applicants and employees.

Affirmative action is not preferential treatment. It does not mean that unqualified persons should be hired or promoted over other people. What affirmative action does mean is that positive steps must be taken to ensure equal employment opportunity for traditionally disadvantaged groups.

### **ENFORCEMENT AND COMPLIANCE**

#### **Compliance Reviews**

OFCCP conducts compliance reviews to investigate the employment practices of Government contractors. During a compliance review, a compliance officer examines the contractor's affirmative action program; checks personnel, payroll, and other employment records; interviews employees and company officials; and investigates virtually all aspects of employment in the company.

The investigator also checks to see whether the contractor is making special efforts to achieve equal opportunity through affirmative action. If problems are discovered, OFCCP will recommend corrective action and suggest ways to achieve equal employment opportunity.

#### **Complaint Investigations**

Individuals may file complaints if they believe they have been discriminated against by federal contractors or subcontractors. Complaints also may be filed by organizations on behalf of the person or persons affected.

Complaints must be filed within 180 days from the date of the alleged discrimination, although filing time can be extended for a good reason.

If a complaint filed under Executive Order 11246 involves discrimination against only one person, OFCCP will normally refer it to the EEOC. Cases involving groups of people or indicating patterns of discrimination are generally investigated and resolved by OFCCP. Complaints may be filed directly with any of OFCCP's regional or district offices throughout the country, or with OFCCP in Washington, D.C.

### **Compliance Assistance**

To help contractors understand their contractual obligations for EEO and affirmative action, OFCCP provides technical assistance. District office staff offers guidance to contractors on how to develop an affirmative program through company seminars, training programs held in conjunction with industry liaison groups, and one-on-one consultations on affirmative action practices and procedures.

### **Enforcing Contract Compliance**

When a compliance review discloses problems, OFCCP attempts to work with the contractor, often entering into a conciliation agreement. A conciliation agreement may include back pay, job offers, seniority credit, promotions or other forms of relief for victims of discrimination. It may also involve new training programs, special recruitment efforts, or other affirmative action measures.

When conciliation efforts are unsuccessful, OFCCP refers the case to the Office of the Solicitor for enforcement through administrative enforcement proceedings. A contractor cited for violating EEO and affirmative action requirements may have a formal hearing before an administrative law judge.

If conciliation is not reached before or after the hearing, sanctions may be imposed. For example, a contractor could lose its government contracts or subcontracts or be debarred, i.e., declared ineligible for any future government contracts.

### **Further Information**

For more information about contract compliance, filing complaints, or compliance assistance, contact any of OFCCP's regional or district offices. All offices are listed in telephone directories under U.S. Department of Labor, Employment Standards Administration, Office of Federal Contract Compliance Programs.

# EQUAL EMPLOYMENT OPPORTUNITY AND AFFIRMATIVE ACTION

Executive Order 11246  
(Excerpts from 41 CFR 60 Parts 1 and 4)

## 41 CFR 60-1.4 - Equal opportunity clause

(b) Federally assisted construction contracts. Except as otherwise provided, each administering agency shall require the inclusion of the following language as a condition of any grant, contract, loan, insurance, or guarantee involving federally assisted construction which is not exempt from the requirements of the equal opportunity clause:

The applicant hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following *equal opportunity clause*:

During the performance of this contract, the contractor agrees as follows:

- (1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause. Such action shall include but not be limited to the following:
- (2) Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- (3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
- (4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will



permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

- (7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

(c) *Subcontracts.* Each nonexempt prime contractor or subcontractor shall include the equal opportunity clause in each of its nonexempt subcontracts.

(d) *Incorporation of the equal opportunity clause by reference.* The equal opportunity clause may be incorporated by reference in all Government contracts and subcontracts, including Government bills of lading, transportation requests, contracts for deposit of Government funds, and contracts for issuing and paying U.S. savings bonds and notes, and such other contracts and subcontracts as the Director may designate.

(e) *Incorporation by operation of the order.* By operation of the order, the equal opportunity clause shall be considered to be a part of every contract and subcontract required by the order and the regulations in this part to include such a clause whether or not it is physically incorporated in such contracts and whether or not the contract between the agency and the contractor is written.

(f) Adaptation of language. Such necessary changes in language may be made in the equal opportunity clause as shall be appropriate to identify properly the parties and their undertakings.

#### **41 CFR 60-4.3 - Equal opportunity clauses**

(a) The equal opportunity clause published at 41 CFR 60-1.4(a) of this chapter is required to be included in, and is part of, all nonexempt Federal contracts and subcontracts, including construction contracts and subcontracts. The equal opportunity clause published at 41 CFR 60-1.4(b) is required to be included in, and is a part of, all nonexempt federally assisted construction contracts and subcontracts. In addition to the clauses described above, all Federal contracting officers, all applicants and all non-construction contractors, as applicable, shall include the specifications set forth in this section in all Federal and federally assisted construction contracts in excess of \$10,000 to be performed in geographical areas designated by the Director pursuant to 60-4.6 of this part and in construction subcontracts in excess of \$10,000 necessary in whole or in part to the performance of non-construction Federal contracts and subcontracts covered under the Executive order.

#### *Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)*

1. As used in these specifications:
  - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
  - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
  - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
  - d. "Minority" includes:
    - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
    - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
    - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
    - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
  - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
  - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
  - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
  - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
  - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
  - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
  - g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
  - h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
  - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations

- serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
  - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
  - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
  - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
  - n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
  - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
  - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance
9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to

comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

(b) The notice set forth in 41 CFR 60-4.2 and the specifications set forth in 41 CFR 60-4.3 replace the New Form for Federal Equal Employment Opportunity Bid Conditions for Federal and Federally Assisted Construction published at 41 FR 32482 and commonly known as the Model Federal EEO Bid Conditions, and the New Form shall not be used after the regulations in 41 CFR Part 60-4 become effective.

[43 FR 49254, Oct. 20, 1978; 43 FR 51401, Nov. 3, 1978, as amended at 45 FR 65978, Oct. 3, 1980]

**NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS**

**NON-DISCRIMINATION IN EMPLOYMENT**

TO: \_\_\_\_\_  
(Name of Union or Organization of Workers)

The undersigned currently holds contract(s) with \_\_\_\_\_  
(Name of Applicant)

involving funds or credit of the U.S. Government of (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contract(s) or subcontract(s) and in accordance with Executive Order 11246, dated September 24, 1965, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, age, handicap, veteran status, color, creed, or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

**HIRING, PLACEMENT, UPGRADING, TRANSFER, OR DEMOTION,  
RECRUITMENT, ADVERTISING, OR SOLICITATION FOR  
EMPLOYMENT TRAINING DURING EMPLOYMENT, RATES OF PAY  
OR OTHER FORMS OF COMPENSATION, SELECTION FOR TRAINING  
INCLUDING APPRENTICESHIP, LAYOFF, OR TERMINATION.**

This notice is furnished you pursuant to the provisions of the above contract(s) or subcontract(s) and Executive Order 11246.

**COPIES OF THIS NOTICE WILL BE POSTED BY THE UNDERSIGNED IN CONSPICUOUS PLACES AVAILABLE TO EMPLOYEES OR APPLICANTS FOR EMPLOYMENT.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
(Contractor or Subcontractor)

\_\_\_\_\_  
(Date)

**UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY**

**ASSURANCE OF COMPLIANCE  
FOR  
TITLE VI OF THE CIVIL RIGHTS ACT OF 1964  
AND  
SECTION 13 OF THE FWPCA AMENDMENTS OF 1972**

NAME AND ADDRESS OF APPLICANT/RECIPIENT ( <i>Hereinafter called ASSUROR</i> )	GRANT IDENTIFICATION NUMBER <i>(To be completed by EPA)</i>	GRANT AMOUNT REQUESTED \$
	TYPE OF GRANT <input type="checkbox"/> DEMONSTRATION <input type="checkbox"/> RESEARCH <input type="checkbox"/> TRAINING <input type="checkbox"/> OTHER ( <i>Specify</i> ):	
	CHECK ONE: <input type="checkbox"/> NEW <input type="checkbox"/> CONTINUATION	

HEREBY AGREES THAT IT will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and all requirements of the U.S. Environmental Protection Agency (*hereinafter called "EPA"*) issued pursuant to that title, to the end that in accordance with Title VI of that Act, no person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Assuror receives financial assistance from EPA and hereby gives assurance that it will now and hereafter take all necessary measures to effectuate this agreement.

HEREBY AGREES THAT IT will comply with all applicable requirements of Section 13 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) and all requirements of EPA issued pursuant to that section, to the end that in accordance with that section of that Act, no person in the United States shall, on the ground of sex be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity under the said Federal Water Pollution Control Act Amendments for which the Assuror receives assistance from EPA and hereby gives assurance that it will now and hereafter take all necessary measures to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of financial assistance extended to the Assuror by EPA, this Assurance obligates the Assuror, or, in the case of any transfer of such property, any transferee for the period during which the real property or structure is used for a purpose involving the provisions of similar services or benefits. If any personal property is so provided, this Assurance obligates the Assuror for the period during which it retains ownership or possession of the property. In all other cases, this Assurance obligates the Assuror for the period during which the financial assistance is extended to it by EPA.

THE ASSURANCE is given in consideration of and for the purpose of obtained any and all Federal grants, loans, contracts, property discounts or other financial assistance extended after the date hereof to the Assuror by EPA including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The Assuror recognizes and agrees that such Federal financial assistance will be extended in reliance on the representations and agreements made in this Assurance and that the United States shall reserve the right to seek judicial enforcement of this Assurance. The Assurance is binding on the Assuror, its successors, transferees, and assignees, and the person or persons whose signature appear below are authorized to sign this Assurance on behalf of the Assuror.

The obligations assumed by the Assuror hereunder are in addition to any obligations which may be imposed to the Assuror by any applicable regulation now outstanding or which may hereafter be adopted by EPA to effectuate any provision or goal of the said Title VI and all applicable requirements of the said Section 13, and no part of this Assurance shall be read so as to in any way detract from or modify any obligation which may be imposed on the Assuror by any such regulation standing alone.

SIGNATURE OF ASSUROR BY PRESIDENT, CHAIRMAN OF BOARD OR COMPARABLE AUTHORIZED OFFICIAL	DATE
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# **CONTRACTING WITH SMALL AND MINORITY FIRMS, WOMEN'S BUSINESS ENTERPRISE**

## **40 CFR 31.36(e)**

40 CFR 31.36(e) – Contracting with small and minority firms, women's business enterprise and labor surplus area firms.

(1) The grantee and sub-grantee will take all necessary affirmative steps to assure that minority firms, women's business enterprises, and labor surplus area firms are used when possible.

(2) Affirmative steps shall include:

- (i) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
- (ii) Assuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;
- (iii) Dividing the total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
- (iv) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
- (v) Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce; and
- (vi) Requiring the prime contractor, if subcontracts are to be let, to take affirmative steps listed in paragraphs (e)(2)(i) through (v) of this section.

# TITLE 37

## CHAPTER 2.1 DOMESTIC STEEL

### Section

37-2.1-1.	Short Title
37-2.1-2.	Purpose
37-2.1-3.	Purchase of steel and steel products
37-2.1-4.	Payment
37-2.1-5.	Definitions

#### **37-2.1-1. Short title.**

This chapter shall be known and may be cited as the "Steel Products Procurement Act".

#### **37-2.1-2. Purpose.**

- (a) This chapter shall be deemed to be an exercise of the police powers of the state for the protection of the health, safety, and general welfare of the people of the state.
- (b) It is hereby determined by the general assembly of Rhode Island and declared as a matter of legislative findings that:
- (1) The United States is one of the leading countries in the production and use of steel and its allied products;
  - (2) The use of steel products constitutes a major industry of the United States and, as such, provides the jobs and family incomes of millions of persons in the United States;
  - (3) The taxes paid to Rhode Island and the United States by employers and employees engaged in the production and sale of steel products are one of the largest single sources of public revenues in this country;
  - (4) It has, for many years, been the policy of the state to aid and support the development and expansion of industry in the United States in order to foster the economic well-being of the state and its people; and
  - (5) The economy, general welfare, and national security of the United States, are inseparably related to the preservation and development of the steel industry in the United States.
- (c) The general assembly therefore declares it to be the policy of the state that all public officers and agencies should, at all times, aid and promote the development of the steel industry of the United States in order to stimulate and improve the economic well-being of the state and its people.

#### **37-2.1-3. Purchase of steel and steel products.**

- (a) Every public agency shall require that every contract document for the construction, reconstruction, alteration, repair, improvement, or maintenance of public works contain a provision that, if any steel products are to be used or supplied in the performance of the contract, only steel products as herein defined shall be used or supplied in the performance of the contract or any subcontracts thereunder.
- (b) This section shall not apply in any case where the head of the public agency, in writing, determines that steel products as herein defined are not produced in, or readily available in the United States or that such steel products shall not exceed fifteen percent (15%) of the costs of any other steel products obtainable nationally or internationally.

#### **37-2.1-4. Payment.**

No public agency shall authorize, provide for, or make any payments to any person under any contract containing the provision required by 37-2.1-3 unless the public agency is satisfied that such person has fully complied with that provision. Any such payments made to any person by any public agency which should not have been made, as a result of this section, shall be recoverable directly from the contractor or subcontractor who did not comply with 37-2.1-3 by either such public agency or the attorney general upon suit filed in the court of any county.

### **37-2.1-5. Definitions.**

The following words and phrases when used in this chapter shall have, unless the context clearly indicates otherwise, the meanings given to them in this section:

- (a) "Person" means natural persons as well as corporations, partnerships, business units, and associations;
- (b) "Public agency" means (1) the state and its departments, boards, commissions and agencies, (2) cities, towns, school districts, and any other governmental unit or district, (3) any and all other public bodies, authorities, officers, agencies, or instrumentalities, whether exercising a governmental or proprietary function;
- (c) "Public works" means steel to construct, frame or reinforce any public structure, building, highway, waterway, street, bridge, transit system, airport, or other betterment, work or improvement, whether of a permanent or temporary nature, and whether for governmental or proprietary use;
- (d) "Steel products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated, or otherwise similarly processed, or processed by a combination of two or more of such operations, from steel made in the United States by the open hearth, basic oxygen, electric furnace, Bessemer, or other steel making process;
- (e) "United States" means the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

# TITLE 37

## CHAPTER 12 CONTRACTORS' BONDS

### Sections

- 37-12-1. Contractors required to give bond – Terms and conditions.
- 37-12-2. Rights of persons furnishing labor and materials.
- 37-12-3. Remedies of creditors and state – Priority of claims.
- 37-12-4. Intervention by creditor in suit brought by state.
- 37-12-5. Time limitation on creditors' actions.
- 37-12-6. Intervention in suit brought by creditor – Consolidation of suits.
- 37-12-7. Notice of Pendency of Suit
- 37-12-8. Certified copies of documents.
- 37-12-9. Payment into court by surety – Discharge.
- 37-12-10. Retainers relating to contracts for public works or sewer or water main construction.
- 37-12-11. Substitution of securities for retained earnings.

**§ 37-12-1. Contractors required to give bond – Terms and conditions.** – Every person (which word for the purposes of this chapter shall include a co-partnership, a number of persons engaged in a joint enterprise, or a corporation), before being awarded a contract by the department of transportation or by the department of administration, as the case may be, and every person awarded such a contract as a general contractor or construction or project manager for the construction, improvement, completion, or repair of any public road or portion thereof or of any bridge in which the contract price shall be in excess of fifty thousand dollars (\$ 50,000), or for a contract for the construction, improvement, completion, or repair of any public building, or portion thereof, shall be required to furnish to the respective department a bond of that person to the state, with good and sufficient surety or sureties (hereafter in this chapter referred to as surety), acceptable to the respective department, in a sum not less than fifty percent (50%) and not more than one hundred percent (100%) of the contract price, conditioned that the contractor, principal in the bond, the person's executors, administrators, or successors, shall in all things, well and truly keep and perform the covenants, conditions, and agreements in the contract, and in any alterations thereof made as therein provided, on the person's part to be kept and performed, at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the state, the respective department, and all of its officers, agents, and employees, as therein stipulated, and shall also promptly pay for all such labor performed or furnished and for all such materials and equipment furnished, (which as to equipment shall mean payment of the reasonable rental value, as determined by the respective department, of its use during the period of its use), as shall be used in the carrying on of the work covered by the contract, or shall see that they are promptly paid for, whether or not the labor is directly performed for or furnished to the contractor or is even directly performed upon the work covered by the contract, and whether or not the materials are furnished to the contractor or become component parts of the work, and whether or not the equipment is furnished to the contractor or even directly used upon the work. The bond shall contain the provisions that it is subject to all such rights and powers of the respective department and such other provisions as are set forth in the contract and the plans, specifications, and proposal incorporated by reference in the contract, and that no extension of the time of performance of the contract or delay in the completion of the work thereunder or any alterations thereof, made as therein provided, shall invalidate the bond or release the liability of the surety thereunder. Waiver of the bonding requirements of this section is expressly prohibited.

### **37-12-2. Rights of persons furnishing labor and materials.**

Every person who shall have performed labor and every person who shall have furnished or supplied labor, material, or equipment in the prosecution of the work provided for in the contract, in respect of which a payment bond is furnished under § 37-12-1, and who has not been paid in full therefor before the expiration of a period of ninety (90) days after the day on which the last of the labor was performed or furnished by him or her, or material or equipment furnished or supplied by him or her for which a claim is made, shall have the right to sue on the payment bond for the amount, or the balance thereof, unpaid at the time of institution of the suit and to prosecute the action to final execution and judgment for the sum or sums justly due him or her; provided, however, that any person having direct contractual relationship with a subcontractor but no contractual relationship express or implied with the contractor

furnishing the payment bond shall have a right of action upon the payment bond upon giving written notice to the contractor within ninety (90) days from the date on which the person furnished or performed the last of the labor, or furnished or supplied the last of the material or equipment for which the claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the labor was furnished or performed or the material or equipment was furnished or supplied. The notice shall be served by mailing the same by certified mail, postage prepaid, in an envelope addressed to the contractor at any place he or she maintains an office, conducts his or her business, or his or her residence.

### **37-12-3. Remedies of creditors and state - Priority of claims.**

The remedy on the bond shall be by a civil action brought in the superior court for the counties of Providence and Bristol and in any suit brought on the bond the rights of the state shall be prior to those of all creditors. The rights of persons who shall have performed labor as aforesaid shall be prior to the rights of all other creditors, and there shall be no priorities among laborers or among other creditors under the bond. The state, either after having recovered a judgment against the contractor on the contract or without having recovered a judgment, may bring a suit on the bond against the contractor and surety on the bond, and may join as parties defendant in the suit any persons claiming to have rights under the bond as creditors; and, if it has not brought such a suit, it may at any time before a final and conclusive decree, intervene and become a party in any suit brought, as hereafter provided in this chapter, by any person claiming to be a creditor under the bond.

### **37-12-4. Intervention by creditor in suit brought by state.**

Any person claiming to be a creditor under the bond may at any time intervene and become a party in any pending suit brought as aforesaid by the state on the bond, and by so intervening may have the rights to the person adjudicated in the suit.

### **37-12-5. Time limitation on creditors' actions.**

No suit instituted under § 37-12-2 shall be commenced after the expiration of two (2) years, or under the maximum time limit as contained within any labor or material payment bond required under § 37-12-1, whichever period is longer, after the day on which the last of the labor was furnished or performed or material or equipment was furnished or supplied by any person claiming under the section.

### **37-12-6. Intervention in suit brought by creditor - Consolidation of suits.**

When a suit has been so brought on the bond by a person claiming to be a creditor under the bond and is pending, any other person claiming to be a creditor under the bond may intervene and become a party in the first suit thus brought and pending and by so intervening may have the rights of the other person adjudicated in the suit. If two (2) or more of the suits be filed in the court on the same day, the one in which the larger sum shall be claimed shall be regarded as the earlier suit. All suits brought upon the bond as provided in this chapter shall be consolidated together by the court and heard as one suit.

### **37-12-7. Notice of pendency of suit.**

In any suit brought under the provisions of this chapter such personal notice of the pendency of the suit as the court may order shall be given to all such known creditors and persons claiming to be creditors under the bond as shall not have entered their appearances in the suit and, in addition to the notice, notice of the pendency of the suit shall be given by publication in some newspaper published in this state of general circulation in the city or town or every city or town in which the work covered by the contract was carried on, once a week for three (3) successive weeks, in such form as the court may order. The court, however, may dispense with the notices if satisfied that sufficient notices shall have been given in some other suit brought under the provisions of this chapter.

### **37-12-8. Certified copies of documents.**

Any person claiming to be a creditor under the bond and having filed a claim with the respective department, in accordance with the requirements of § 37-12-2, shall have the right, at any time when the person could under this chapter file a suit or intervene in a pending suit, to require the respective department to furnish to the person certified copies of the contract, proposal, plans specifications, and bond.

### **37-12-9. Payment into court by surety - Discharge.**

The surety on the bond may pay into the registry of the court, for distribution among those who may be or become entitled thereto under the decree of the court, the penal sum named in the bond less any amount which the surety

may have paid to the state in satisfaction of the liability of the surety to the state under the bond, and then shall be entitled to be discharged from all further liability under the bond.

### **37-12-10. Retainers relating to contracts for public works or sewer or water main construction.**

(a) Upon substantial completion of the work required by a contract aggregating in amount less than five hundred thousand dollars (\$ 500,000) with any municipality, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair, or improvement of sewers and water mains, or any public works project defined in, the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the contract price unless otherwise agreed to by the parties. Upon substantial completion of the work required by a contract aggregating in an amount of five hundred thousand dollars (\$ 500,000) or greater with any municipality, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair, or improvement of sewers and water mains, or any public works project defined in § 37-13-1, the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the contract price. In the case of periodic payments with respect to contracts less than the aggregate amount of five hundred thousand dollars (\$ 500,000), the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the approved amount of any periodic payment unless otherwise agreed to by the parties. In the case of periodic payments with respect to contracts in the aggregate amount of five hundred thousand dollars (\$ 500,000) or greater, the awarding authority may deduct from its payment a retention to secure satisfactory performance of the contractual work not exceeding five percent (5%) of the approved amount of any periodic payment.

(b) The retainage shall be paid to any contractor or subcontractor within ninety (90) days of the date the work is accepted by the awarding authority unless a dispute exists with respect to the work. If payment is not made within ninety (90) days for any reason other than a dispute, which, if resolved and it is not the fault of the contractor, interest shall be assessed at the rate of ten percent (10%) per annum on all money which is to be paid to the contractor or subcontractor.

(c) The retainage shall be paid to any contractor or subcontractor within ninety (90) days of the date his or her work is completed and accepted by the awarding authority. If payment is not made, interest shall be assessed at the rate of ten percent (10%) per annum.

(d) There shall also be deducted and retained from the contract price an additional sum sufficient to pay the estimated cost of municipal police traffic control on any public works project. Municipalities shall directly pay the officers working traffic details and shall bill and be reimbursed by the withholding authority for which the contract is being performed every thirty (30) days until the project is complete.

(e) Notwithstanding the foregoing, with respect to projects located within the town of Warren, the withholding authority shall hold an amount from the contract price which shall be reasonably sufficient to pay the estimated cost of municipal police traffic control. The withholding authority shall pay to the town of Warren within seventy-two (72) hours of written demand the actual costs of police traffic control associated with said project on an ongoing basis.

### **37-12-11. Substitution of securities for retained earnings.**

(a) Where any public works contract as defined by § 37-13-1 provides for the retention of earned estimates by the state of Rhode Island, the contractor may, from time to time, withdraw the whole or any portion of the amount retained for payments to the contractor pursuant to the terms of the contract, upon depositing with the general treasurer either; (1) United States treasury bonds, United States treasury notes, United States treasury certificates of indebtedness, or United States treasury bills; (2) Bonds or notes of the state of Rhode Island ; or (3) Bonds of any political subdivision in the state of Rhode Island.

(b) No amount shall be withdrawn in excess of the market value of the securities at the time of deposit or of the par value of the securities, whichever is lower. The general treasurer shall, on a regular basis, collect all interest or income on the obligations so deposited and shall pay the interest or income, when and as collected, to the contractor who deposited the obligations. If the deposit is in the form of coupon bonds, the general treasurer shall deliver each coupon as it matures to the contractor. Any amount deducted by the state, or by any public department or official thereof, pursuant to the terms of the contract, from the retained payments otherwise due the contractor, shall be

deducted, first from that portion of the retained payments for which no security has been substituted, then from the proceeds of any deposited security. In the latter case, the contractor shall be entitled to receive interest, coupons, or income only from those securities which remain after the amount has been deducted. The securities so deposited shall be properly endorsed by the contractor in such manner so as to enable the general treasurer to carry out the provisions of this section.

## TITLE 37

### CHAPTER 12.1 SUBSTITUTION OF SECURITY FOR RETAINED EARNINGS OF ARCHITECTS AND ENGINEERS

#### Sections

- 37-12.1-1. Definition of Terms.
- 37-12.1-2. Substitution of security for retained earnings by designers.
- 37-12.1-3. Deduction from retained earnings.
- 37-12.1-4. Endorsement on securities.
- 37-12.1-5. Applicability.

#### **37-12.1-1. Definition of terms.**

Terms used in this chapter shall be construed as follows:

- (a) "Designers", means any person, firm or corporation duly authorized pursuant to the laws of this state to engage in the practice of architecture and/or engineering within this state.
- (b) "Public works contract" means a contract to perform design or planning services by a designer with the state or any agency or governmental subdivisions thereof.
- (c) "Retained earnings" means any moneys or earned estimates withheld from a designer pursuant to the terms of a public works contract.

#### **37-12.1-2. Substitution of security for retained earnings by designers.**

(a) Where any public works contract provides for the holding of retained earnings from a designer, the designer may from time to time withdraw the whole or any portion of the amount retained upon either depositing with the general treasurer:

- (1) United States treasury bonds, United States treasury notes, United States treasury certificates of indebtedness, or United States treasury bills;
- (2) Bonds or notes of the state of Rhode Island; or
- (3) Bonds of any political subdivision of the state of Rhode Island.

(b) With respect to the deposit of securities, the general treasurer shall, on a regular basis, collect all interest or income on the securities so deposited and shall pay the interest or income when and as collected to the designer depositing the securities. If the security is in the form of coupon bonds, the general treasurer shall deliver each coupon as it matures to the designer.

#### **37-12.1-3. Deduction from retained earnings.**

In the event that pursuant to the terms of the public works contract it is necessary to deduct any sum from retained earnings, the state or governmental unit or agency thereof shall first apply such deduction against sums not withdrawn and thereafter from the proceeds of the sale of any securities deposited or from the income earned on such securities, whichever is applicable.

#### **37-12.1-4. Endorsement on securities.**

All securities deposited with the general treasurer pursuant to this chapter shall be properly endorsed by the designer in such manner as to enable the general treasurer to carry out the provisions of this chapter.

#### **37-12.1-5. Applicability.**

This chapter shall apply to all retained earnings held pursuant to any public works contract as of [June 16, 1991].



# TITLE 37

## CHAPTER 13 LABOR AND PAYMENT OF DEBTS BY CONTRACTORS

### Sections

- 37-13-1. "Public Works" defined
- 37-13-2. "Contractor" defined – information required.
- 37-13-3. Contractors subject to provisions – Weekly payment of employees.
- 37-13-3.1 State public works contract apprenticeship requirements
- 37-13-4. Provisions applicable to public works contracts – List of Subcontractors.
- 37-13-5. Payment for trucking or materials furnished – Withholding of sums due.
- 37-12-6. Ascertainment of prevailing rate of wages and other payments – Specification of rate in call for bids and in contract.
- 37-13-7. Specification in contract of amount and frequency of payment and wages.
- 37-13-8. Investigation and determination of prevailing wages – Filing of schedule.
- 37-13-9. Statutory provisions included in contracts.
- 37-13-10. Overtime compensation.
- 37-13-11. Posting of prevailing wage rates.
- 37-13-12. Wage records of contractors.
- 37-13-12.1. Obstruction of enforcement.
- 37-13-12.2. Subpoena powers.
- 37-13-12.3. Compelling obedience to subpoenas.
- 37-13-12.4. Penalty for violations.
- 37-13-13. Furnishing payroll record to director of labor.
- 37-13-13.1. Audits of wage records of out of state contractors and subcontractors.
- 37-13-14. Contractor's bond.
- 37-13-14.1. Enforcement – Hearings.
- 37-13-15. Review.
- 37-13-16. Termination of work on failure to pay agreed wages – Completion of work.
- 37-13-17. Private right of action to collect wages or benefits

### **37-13-1. "Public works" defined.**

"Public works" as used in this chapter shall mean any public work consisting of grading, clearing, demolition, improvement, completion, repair, alteration, or construction of any public road or any bridge, or portion thereof, or any public building or portion thereof, or any heavy construction, or any public works projects of any nature or kind whatsoever.

### **37-13-2. "Contractor" defined - Information required.**

The term "contractor" as used in this chapter shall mean the bidder whose bid has been accepted by an authorized agency or awarding authority as the bidder possessing the skills, ability, and integrity necessary to the faithful performance of the contract or work, and who shall certify that he or she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the contract or work. Essential information in regard to qualifications shall be submitted in such form to the awarding authority and the director of labor and training as the director of labor and training shall require. The authorized agency or awarding authority shall reserve the right to reject all bids, if it be in the public interest to do so.

### **37-13-3. Contractors subject to provisions - Weekly payment of employees.**

All contractors, who have been awarded contracts for public works by an awarding agency or authority of the state or of any city, town, committee, or by any person or persons therein, in which state or municipal funds are used and of which the contract price shall be in excess of one thousand dollars (\$1,000) whether payable at the time of the signing of the contract or at a later date, and their subcontractors, on such public works shall pay their employees at weekly intervals and shall comply with the provisions set forth in 37-13-4 - 37-13-14, inclusive, and 37-13-16.

### **37-13-3.1. State public works contract apprenticeship requirements.**

Notwithstanding any laws to the contrary, all general contractors and subcontractors who perform work on any public works contract awarded by the state after passage of this act and valued at one million dollars (\$ 1,000,000) or more shall employ apprentices required for the performance of the awarded contract. The number of apprentices shall comply with the apprentice to journeyman ratio for each trade approved by the apprenticeship council of the department of labor and training. To the extent that any of the provisions contained in this section conflict with the requirements for federal aid contracts, federal laws and regulations shall control.

### **37-13-4. Provisions applicable to public works contracts - Lists of subcontractors.**

All public works shall be done by contract, subject to the same provisions of law relating thereto and to the letting thereof, which are applicable to similar contracts of the awarding authority or authorized agency, hereinafter called the "proper authority," in the general location where the work is to be performed and which are not contrary to the provisions of 37-13-1 - 37-13-14, and 37-13-16. Each contractor after the award of a contract for public works shall submit to the proper authority a list of his or her subcontractors of any part or all of the work. The list shall be submitted in such manner or form as the proper authority shall uniformly require from contractors in all public works.

### **37-13-5. Payment for trucking or materials furnished - Withholding of sums due.**

A contractor or subcontractor on public works authorized by a proper authority shall pay any obligation or charge for trucking and material which have been furnished for the use of the contractor or subcontractor, in connection with the public works being performed by him or her, within ninety (90) days after the obligation or charge is incurred or the trucking service has been performed or the material has been delivered to the site of the work, whichever is later. When it is brought to the notice of the proper authority in a city or town, or the proper authority in the state having supervision of the contract, that the obligation or charge has not been paid by the contractor or subcontractor, the proper authority may deduct and hold for a period not exceeding sixty (60) days, from sums of money due to the contractor or subcontractor, the equivalent amount of such sums certified by a trucker or material man creditor as due him or her, as provided in this section, and which the proper authority determines is reasonable for trucking performed or materials furnished for the public works.

### **37-13-6. Ascertainment of prevailing rate of wages and other payments - Specification of rate in call for bids and in contract.**

Before awarding any contract for public works to be done, the proper authority shall ascertain from the director of labor and training the general prevailing rate of the regular, holiday, and overtime wages paid and the general prevailing payments on behalf of employees only, to lawful welfare, pension, vacation, apprentice training, and educational funds (payments to the funds must constitute an ordinary business expense deduction for federal income tax purposes by contractors) in the city, town, village, or other appropriate political subdivision of the state in which the work is to be performed, for each craft, mechanic, teamster, laborer, or type of worker needed to execute the contract for the public works. The proper authority shall, also, specify in the call for bids for the contract and in the contract itself the general prevailing rate of the regular, holiday, and overtime wages paid and the payments on behalf of employees only, to the welfare, pension, vacation, apprentice training, and education funds existing in the locality for each craft, mechanic, teamster, laborer, or type of worker needed to execute the contract or work.

### **37-13-7. Specification in contract of amount and frequency of payment of wages.**

Every call for bids for every contract in excess of one thousand dollars (\$ 1,000), to which the state of Rhode Island or any political subdivision thereof or any public agency or quasi-public agency is a party, for construction, alteration, and/or repair, including painting and decorating, of public buildings or public works of the state of Rhode Island or any political subdivision thereof, or any public agency or quasi-public agency and which requires or involves the employment of employees, shall contain a provision stating the minimum wages to be paid various types of employees which shall be based upon the wages that will be determined by the director of labor and training to be prevailing for the corresponding types of employees employed on projects of a character similar to the contract work in the city, town, village, or other appropriate political subdivision of the state of Rhode Island in which the work is to be performed. Every contract shall contain a stipulation that the contractor or his or her subcontractor shall pay all the employees employed directly upon the site of the work, unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment computed at wage rates not less than those stated in the call for bids, regardless of any contractual relationships which may be alleged to exist between the contractor or subcontractor and the employees, and that the scale of wages to be paid shall be posted by the contractor in a prominent and easily accessible place at the site of the work; and the further stipulation that there may be withheld from the contractor so much of the accrued payments as may be considered necessary to pay to the employees employed by the contractor, or any subcontractor on the work, the difference between the rates of wages required by the contract to be paid the employees on the work and the rates of wages received by the employees and not refunded to the contractor, subcontractors, or their agents.

(b) The terms "wages" , "scale of wages" , "wage rates" , "minimum wages" , and "prevailing wages" shall include:

(1) The basic hourly rate of pay; and

(2) The amount of:

(A) The rate of contribution made by a contractor or subcontractor to a trustee or to a third person pursuant to a fund, plan, or program; and

(B) The rate of costs to the contractor or subcontractor which may be reasonably anticipated in providing benefits to employees pursuant to an enforceable commitment to carry out a financially responsible plan or program which was communicated in writing to the employees affected, for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance, disability and sickness insurance, or accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the contractor or subcontractor is not required by other federal, state, or local law to provide any of the benefits ; provided, that the obligation of a contractor or subcontractor to make payment in accordance with the prevailing wage determinations of the director of labor and training insofar as this chapter of this title and other acts incorporating this chapter of this title by reference are concerned may be discharged by the making of payments in cash, by the making of contributions of a type referred to in subsection ( b)(2), or by the assumption of an enforceable commitment to bear the costs of a plan or program of a type referred to in this subdivision, or any combination thereof, where the aggregate of any payments, contributions, and costs is not less than the rate of pay described in subsection (b)(1) plus the amount referred to in subsection (b)(2).

(c) The term "employees" , as used in this section, shall include employees of contractors or subcontractors performing jobs on various types of public works including mechanics, apprentices, teamsters, chauffeurs, and laborers engaged in the transportation of gravel or fill to the site of public works, the removal and/or delivery of gravel or fill or ready-mix concrete, sand, bituminous stone, or asphalt flowable fill from the site of public works, or the transportation or removal of gravel or fill from one location to another on the site of public works, and the employment of the employees shall be subject to the provisions of subsections (a) and (b) .

(d) The terms "public agency" and "quasi-public agency" shall include, but not be limited to, the Rhode Island industrial recreational building authority, the Rhode Island economic development corporation, the Rhode Island airport corporation, the Rhode Island industrial facilities corporation, the Rhode Island refunding bond authority, the Rhode Island housing and mortgage finance corporation, the Rhode Island resource recovery corporation, the Rhode Island public transit authority, the Rhode Island student loan authority, the water resources board corporate, the Rhode Island health and education building corporation, the Rhode Island turnpike and bridge authority, the Narragansett Bay water quality management district commission, Rhode Island telecommunications authority, the

convention center authority, the board of governors for higher education, the board of regents for elementary and secondary education, the capital center commission, the housing resources commission, the Quonset Point-Davisville management corporation, the Rhode Island children's crusade for higher education, the Rhode Island depositors economic protection corporation, the Rhode Island lottery commission, the Rhode Island partnership for science and technology, the Rhode Island public building authority, and the Rhode Island underground storage tank board.

### **37-13-8. Investigation and determination of prevailing wages - Filing of schedule.**

The director of labor and training shall investigate and determine the prevailing wages and payments made to or on behalf of employees, as set forth in § 37-13-7, paid in the trade or occupation in the city, town, village, or other appropriate political subdivision of the state and keep a schedule on file in his or her office of the customary prevailing rate of wages and payments made to or on behalf of the employees which shall be open to public inspection. In making a determination, the director of labor may adopt and use such appropriate and applicable prevailing wage rate determinations as have been made by the secretary of labor of the United States of America in accordance with the Davis-Bacon Act, as amended, 40 U.S.C. § 276a; provided, however, that each contractor awarded a public works contract after July 1, 2007 shall contact the department of labor and training on or before July first of each year, for the duration of such contract to ascertain the prevailing wage rate of wages on a hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done each year and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee every July first.

### **37-13-9. Statutory provisions included in contracts.**

A copy of 37-13-5, 37-13-6, and 37-13-7 shall be inserted in all contracts for public works awarded by the state or any city or town, committee, an authorized agency or awarding authority thereof, or any person or persons in their behalf in which state or municipal funds are used if the contract price be in excess of one thousand dollars (\$1,000).

### **37-13-10. Overtime compensation.**

Labor performed under the provisions of 37-13-1 - 37-13-16, inclusive, during the period of forty (40) hours in any one week and during the period of eight (8) hours in any one day, shall be considered a legal week's work or a legal day's work, as the case may be, and any number of hours of employment in any one week greater than the number of forty (40) hours or in any one day greater than the number of eight (8) hours shall be compensated at the prevailing rate of wages for overtime employment; provided, however, when the director of labor and training has determined in the investigation provided for in 37-13-7 and 37-13-8 that there is a prevailing practice in a city, town, or other appropriate political subdivision to pay an overtime rate of wages for work of any craft, mechanic, teamster, laborer, or type of worker needed to execute the work other than hours worked in any one week greater than the number of forty (40) or in hours worked in any one day greater than the number of eight (8), then the prevailing practice shall determine the legal workday and the legal workweek in the city or town for the work and the prevailing rate of overtime wages shall be paid for such work in excess of that legal workday or week, as the case may be.

### **37-13-11. Posting of prevailing wage rates.**

Each contractor awarded a contract for public works with a contract price in excess of one thousand dollars (\$ 1,000), and each subcontractor who performs work on those public works, shall post in conspicuous places on the project, where covered workers are employed, posters which contain the current, prevailing rate of wages and the current, prevailing rate of payments to the funds required to be paid for each craft or type of worker employed to execute the contract as set forth in §§ 37-13-6 and 37-13- 7, and the rights and remedies of any employee described in § 37-13-17 for nonpayment of any wages earned pursuant to this chapter. Posters shall be furnished to contractors and subcontractors by the director of labor and training, who shall determine the size and context thereof from time to time, at the time a contract is awarded. A contractor or subcontractor who fails to comply with the provisions of this section shall be deemed guilty of a misdemeanor and shall pay to the director of labor and training one hundred dollars (\$ 100) for each calendar day of noncompliance as determined by him or her. Contracts set forth in this section shall not be awarded by the state, any city, town, or any agency thereof until the director of labor and training has prepared and delivered the posters to the division of purchases, if the state or any agency thereof is the proper authority, or to the city, town, or an agency thereof, if it is the proper authority, and the contractor to whom the contract is to be awarded.

### **37-13-12. Wage records of contractors.**

Each contractor awarded a contract with a contract price in excess of one thousand dollars (\$1,000) for public works, and each subcontractor who performs work on those public works, shall keep an accurate record showing the name, occupation, and actual wages paid to each worker employed by him or her and the payments to all the employee funds specified in sections 37-13-6 and 37-13-7 by him or her in connection with the contract or work. The director and his or her authorized representatives shall have the right to enter any place of employment at all reasonable hours for the purpose of inspecting the wage records and seeing that all provisions of this chapter are complied with.

### **37-13-12.1. Obstruction of enforcement.**

Any effort of any employer to obstruct the director and his or her authorized representatives in the performance of their duties shall be deemed a violation of this chapter and punishable as such.

### **37-13-12.2. Subpoena powers.**

The director and his or her authorized representatives shall have power to administer oaths and examine witnesses under oath, issue subpoenas, subpoenas duces tecum, compel the attendance of witnesses, and the production of papers, books, accounts, records, payrolls, documents, and testimony, and to take depositions and affidavits in any proceeding before the director.

### **37-13-12.3. Compelling obedience to subpoenas.**

In case of failure of any person to comply with any subpoena lawfully issued, or subpoena duces tecum, or on the refusal of any witness to testify to any matter regarding which he may be lawfully interrogated, it shall be the duty of the superior court, or any judge thereof, on application by the director, to compel obedience by proceedings in the nature of those for contempt.

### **37-13-12.4. Penalty for violations.**

Except as otherwise provided in this chapter, any employer who shall violate or fail to comply with any of the provisions of this chapter shall be guilty of a misdemeanor and shall be punished by a fine of not less than five hundred dollars (\$500) nor more than one thousand dollars (\$1,000) for each separate offense, or by imprisonment of up to one year, or by both fine and imprisonment. Each day of failure to pay wages due an employee at the time specified in this chapter shall constitute a separate and distinct violation.

### **37-13-13. Furnishing payroll record to director of labor.**

(a) Every contractor and subcontractor awarded a contract for public works as defined by this chapter shall furnish a certified copy of his or her payroll records of his or her employees employed on the project to the awarding authority on a monthly basis for all work completed in the preceding month on a uniform form prescribed by the director of labor and training. Notwithstanding the foregoing, certified payrolls for department of transportation public works may be submitted on the federal payroll form, provided that, when a complaint is being investigated, the director or his or her designee may require that a contractor resubmit the certified payroll on the uniform department form.

(b) Awarding authorities, contractors and subcontractors shall provide any and all payroll records to the director of labor and training within ten (10) days of their request by the director or his or her designee.

(c) In addition, every contractor and subcontractor shall maintain on the site where public works are being constructed and the general or primary contract is one million dollars (\$1,000,000) or more, a daily log of employees employed each day on the public works project. The log shall include, at a minimum, for each employee his or her name, primary job title, and employer and shall be kept on a uniform form prescribed by the director of labor and training. Such log shall be available for inspection on the site at all times by the awarding authority and/or the director of the department of labor and training and his or her designee. This subsection shall not apply to road, highway, or bridge public works projects.

(d) The director of labor and training may promulgate reasonable rules and regulations to enforce the provisions of this section.

(e) The awarding authority of any public works project shall withhold the next scheduled payment to any contractor or subcontractor who fails to comply with the provisions of subsections (a) or (b) above and shall also

notify the director of labor and training. The awarding authority shall withhold any further payments until such time as the contractor or subcontractor has fully complied. If it is a subcontractor who has failed to comply, the amount withheld shall be proportionate to the amount attributed or due to the offending subcontractor as determined by the awarding authority. The department may also impose a penalty of up to five hundred dollars (\$500) for each calendar day of noncompliance with this section, as determined by the director of labor and training. Mere errors and/or omissions in the daily logs maintained under subsection (c) shall not be grounds for imposing a penalty under this subsection.

### **37-13-13.1. Audits of wage records of out of state contractors and subcontractors.**

Out of state contractors or subcontractors who perform work on public works in this state authorize the director of labor and training to conduct wage and hour audits of their payroll records pursuant to the provisions of chapter 14 of title 28.

### **37-13-14. Contractor's bond.**

The state or any city, town, agency, or committee therein awarding contracts for public works shall require the contractor awarded a contract with a contract price in excess of fifty thousand dollars (\$ 50,000) for public works to file with the proper authority good and sufficient bond with surety furnished by any surety company authorized to do business in the state, conditioned upon the faithful performance of the contract and upon the payment for labor performed and material furnished in connection therewith, a bond to contain the terms and conditions set forth in chapter 12 of this title, and to be subject to the provisions of that chapter. Waiver of the bonding requirements of this section is expressly prohibited.

### **37-13-14.1. Enforcement - Hearing**

(a) Before issuing an order or determination, the director of labor and training shall order a hearing thereon at a time and place to be specified, and shall give notice thereof, together with a copy of the complaint or the purpose thereof, or a statement of the facts disclosed upon investigation, which notice shall be served personally or by mail on any person, firm, or corporation affected thereby. The person, firm, or corporation shall have an opportunity to be heard in respect to the matters complained of at the time and place specified in the notice, which time shall be not less than five (5) days from the service of the notice personally or by mail. The hearing shall be held within ten (10) days from the order of hearing. The hearing shall be conducted by the director of labor and training or his or her designee. The hearing officer in the hearing shall be deemed to be acting in a judicial capacity and shall have the right to issue subpoenas, administer oaths, and examine witnesses. The enforcement of a subpoena issued under this section shall be regulated by Rhode Island civil practice law and rules. The hearing shall be expeditiously conducted, and upon such hearing, the hearing officer shall determine the issues raised thereon and shall make a determination and enter an order within ten (10) days of the close of the hearing, and forthwith serve a copy of the order, with a notice of the filing thereof, upon the parties to the proceeding, personally or by mail. The order shall dismiss the charges or direct payment of wages or supplements found to be due, including interest at the rate of twelve percent (12%) per annum from the date of the underpayment to the date of payment, and may direct payment of reasonable attorney's fees and costs to the complaining party.

(b) In addition to directing payment of wages or supplements including interest found to be due, the order shall also require payment of a further sum as a civil penalty in an amount up to three times the total amount found to be due. Further, if the amount of salary owed to an employee pursuant to this chapter but not paid to the employee in violation of thereof exceeds five thousand dollars (\$5,000), it shall constitute a misdemeanor and shall be referred to the office of the attorney general. The misdemeanor shall be punishable for a period of not more than one year in prison and/or fined not more than one thousand dollars (\$1,000). In assessing the amount of the penalty, due consideration shall be given to the size of the employer's business, the good faith of the employer, the gravity of the violation, the history of previous violations, and the failure to comply with recordkeeping or other nonwage requirements. The surety of the person, firm, or corporation found to be in violation of the provisions of this chapter shall be bound to pay any penalties assessed on such person, firm, or corporation. The penalty shall be paid to the department of labor and training for deposit in the state treasury; provided, however, it is hereby provided that the general treasurer shall establish a dedicated "prevailing wages enforcement fund" for the purpose of depositing the penalties paid as provided herein. There is hereby appropriated to the annual budget of the department of labor and training the amount of the fund collected annually under this section, to be used at the direction of the director of labor and training for the sole purpose of enforcing prevailing wage rates as provided in this chapter.

(c) For the purposes of this chapter, each day or part thereof of violation of any provision of this chapter by a person, firm, or corporation, whether the violation is continuous or intermittent, shall constitute a separate and succeeding violation.

(d) In addition to the above, any person, firm, or corporation found in violation of any of the provisions of this chapter by the director of labor and training, an awarding authority, or the hearing officer, shall be ineligible to bid on, or be awarded work by, an awarding authority or perform any such work for a period of no less than eighteen (18) months and no more than thirty-six (36) months from the date of the order entered by the hearing officer. Once a person, firm, or corporation is found to be in violation of this chapter, all pending bids with any awarding authority shall be revoked, and any bid awarded by an awarding authority prior to the commencement of the work shall also be revoked.

(e) In addition to the above, any person, firm, or corporation found to have committed two (2) or more willful violations in any period of eighteen (18) months of any of the provisions of this chapter by the hearing officer, which violations are not arising from the same incident, shall be ineligible to bid on, or be awarded work by, an awarding authority or perform any work for a period of sixty (60) months from the date of the second violation.

(f) The order of the hearing officer shall remain in full force and effect unless stayed by order of the superior court.

(g) The director of labor and training, awarding authority, or hearing officer shall notify the bonding company of any person, firm, or corporation suspected of violating any section of this chapter. The notice shall be mailed certified mail and shall enumerate the alleged violations being investigated.

(h) In addition to the above, any person, firm, or corporation found to have willfully made a false or fraudulent representation on certified payroll records shall be referred to the office of the attorney general. A first violation of this section shall be considered a misdemeanor and shall be punishable for a period of not more than one year in prison and/or fined one thousand dollars (\$1,000). A second or subsequent violation of this section shall be considered a felony and shall be punishable for a period of not more than three (3) years imprisonment, a fine of three thousand dollars (\$3,000), or both. Further, any person, firm, or corporation found to have willfully made a false or fraudulent representation on certified payroll records shall be required to pay a civil penalty to the department of labor and training in an amount of no less than two thousand dollars (\$2,000) and not greater than fifteen thousand dollars (\$15,000) per representation.

### **37-13-15. Review.**

(a) There is hereby created an appeals board which shall be comprised of three (3) members who shall be appointed by the governor; provided, however, that each member of the appeals board shall have at least five (5) years experience with prevailing wage rates as they apply to the construction industry. The members of such appeals board shall serve without compensation. The members of the appeals board shall be appointed for terms of three (3) years except that of the three (3) members originally appointed by each of the appointing authorities; one (1) shall be appointed for a term of one (1) year, one (1) shall be appointed for a term of two (2) years and one (1) for a term of three (3) years.

(b) Any person aggrieved by any action taken by the director of labor and training or his or her designated hearing officer under the authority of this chapter, or by the failure or refusal of the director of labor and training to take any action authorized by this chapter, may obtain a review thereof for the purpose of obtaining relief from the action or lack of action by filing a petition for administrative review and relief, to the appeals board as provided herein. The petition for administrative review shall be filed within twenty (20) days of the action taken by the director of labor and training or designated hearing officer: The petition for administrative review shall be heard within ten (10) days of the date of filing. An aggrieved person under this section shall include:

- (1) Any person who is required to pay wages to his or her employees or make payments to a fund on behalf of his or her employees, as provided in this chapter;
- (2) Any person who is required to be paid wages for his or her labor or on whose behalf payments are required to be paid to funds, as provided by this chapter;
- (3) The lawful collective bargaining representative of a person defined in subdivision (2) above;
- (4) A trade association of which a person defined in subdivision (1) above is a member;
- (5) A proper authority as defined in this chapter;

- (6) A contractor who submitted a bid for work to be or which has been awarded under the provisions of this chapter or a trade association of which he or her is a member, and
  - (7) A labor organization which has one or more written collective bargaining agreements with one or more employers or a trade association which sets forth the hours, wages, and working conditions of a craft, mechanic, teamster, or type of worker needed to execute the work, as provided in this chapter to the extent that it would be affected by the action or the failure to act of the director of labor and training or the hearing officer.
- (c) Any aggrieved person as defined herein may obtain a review of a decision of the appeals board by filing a petition in the superior court in Providence county pursuant to the provisions of the administrative procedures act, praying for review and relief and the petition shall follow the course of and be subject to the procedures for causes filed in the court.
- (d) The director is hereby empowered to enforce his or her decision and/or the decision of the appeals board in the superior court for the county of Providence.

**37-13-16. Termination of work on failure to pay agreed wages - Completion of work.**

Every contract within the scope of this chapter shall contain the further provision that in the event it is found by the director of labor and training that any employee employed by the contractor or any subcontractor directly on the site of the work covered by the contract has been or is being paid a rate of wages less than the rate of wages required by the contract to be paid as aforesaid, the awarding party may, by written notice to the contractor or subcontractor, terminate his or her right as the case may be, to proceed with the work, or such part of the work as to which there has been a failure to pay the required wages, and shall prosecute the work to completion by contract or otherwise, and the contractor and his or her sureties shall be liable to the awarding party for any excess costs occasioned the awarding authority thereby.

**37-13-17. Private right of action to collect wages or benefits**

(a) An employee or former employee, or any organization representing such an employee or former employee, of a contractor or subcontractor may bring a civil action for a violation of § 37-13-7 for appropriate injunctive relief, or actual damages, or both within three (3) years after the occurrence of the alleged violation. An action commenced pursuant to this section, may be brought in the superior court for the county where the alleged violation occurred, the county where the complainant resides, or the county where the person against whom in the civil complaint is filed resides or has their principal place of business. Any contractor or subcontractor who violates the provisions of § 37-13-7 shall be liable to the affected employee or employees in the amount of unpaid wages or benefits, plus interest. A civil action filed in court under this section may be instituted instead of, but not in addition to the director of labor and training enforcement procedures authorized by § 37-13-14.1, provided the civil action is filed prior to the date the director of labor and training issues notice of an administrative hearing.

(b) An employer's responsibility and liability is solely for its own employees.

(c) An action instituted pursuant to this section may be brought by one or more employees or former employees on behalf of himself/herself or themselves and other employees similarly situated, except that no employee shall be a party plaintiff to any such action unless he/she gives his/her consent in writing to become such a party and such consent is filed in the court in which such action is brought.

(d) In an action filed under this section in which the plaintiff prevails, the court shall, in addition to any judgment awarded to the plaintiff, require reasonable attorneys' fees and the costs of the action to be paid by the defendant.

(e) The court in an action filed under this section shall award affected employees or former employees liquidated damages in an amount equal to two (2) times the amount of unpaid wages or benefits owed. Unpaid fringe benefit contributions owed pursuant to this section in any form shall be paid to the appropriate benefit fund, however, in the absence of an appropriate fund the benefit shall be paid directly to the individual.

(f) The filing of a civil action under this section shall not preclude the director of labor and training from referring a matter to the attorney general as provided in § 37-13-14.1(b), from prohibiting a contractor or subcontractor from bidding on or otherwise participating in contracts as provided in § 37-13-14.1(d), (e) and (h), or from prohibiting termination of work on failure to pay agreed wages pursuant to § 37-13-16.



(g) Any person, firm, or corporation found to have willfully made a false or fraudulent representation in connection with wage obligations owed on a contract shall be required to pay a civil penalty to the department of labor and training in an amount of no less than one thousand dollars (\$ 1,000) and not greater than three thousand dollars (\$ 3,000) per representation. Such penalties shall be recoverable in civil actions filed pursuant to this section. For purposes of this subsection "willfully" shall mean representations that are known to be false, or representations made with deliberate ignorance or reckless disregard for their truth or falsity.

(h) An employer shall not discharge, threaten, or otherwise discriminate against an employee, or former employee, regarding compensation terms, conditions, locations or privileges of employment because the employee or former employee, or a person or organization acting on his or her behalf: (1) Reports or makes a complaint under this section; or otherwise asserts his or her rights under this section; and/or (2) Participates in any investigation, hearing or inquiry held by the director of labor and training under § 37-13-14.1. In the event a contractor or subcontractor retaliates or discriminates against an employee in violation of this section, the affected employee may file an action in any court of competent jurisdiction and the court shall order reinstatement and/or restitution of the affected employee, as appropriate, with back pay to the date of the violation, and an additional amount in liquidated damages equal to two (2) times the amount of back pay and reasonable attorneys' fees and costs.

(i) If any one or more subsections of this section shall for any reason be adjudged unconstitutional or otherwise invalid, the judgment shall not affect, impair, or invalidate the remaining subsections.

## **PREVAILING WAGE RATES**

**(Appropriate wage rate to be inserted by bidder in specifications)**

**For a copy of the appropriate wage rate, contact:**

**R.I. Department of Labor and Training  
Center General Complex  
1511 Pontiac Avenue  
Cranston, RI 02920**

# TITLE 37

## CHAPTER 14.1 MINORITY BUSINESS ENTERPRISE

### Sections

37-14.1-1.	Purpose.
37-14.1-2.	Applicability.
37-14.1-3.	Definitions.
37-14.1-4.	Policy.
37-14.1-5.	Discrimination prohibited.
37-14.1-6.	Minority business enterprise guidelines.
37-14.1-7.	Establishment of criteria and guidelines.
37-14.1-8.	Sanctions.

### **37-14.1-1. Purpose.**

The purpose of this chapter is to carry out the state's policy of supporting the fullest possible participation of firms owned and controlled by minorities and women (MBE's), in state funded and state directed public construction programs and projects and in state purchases of goods and services. This includes assisting MBE's throughout the life of contracts in which they participate.

### **37-14.1-2. Applicability.**

This chapter shall apply to any and all state purchasing, including, but not limited to the procurement of goods, services, construction projects, or contracts funded in whole or in part by state funds, or funds which, in accordance with a federal grant or otherwise, the state expends or administers or in which the state is a signatory to the construction contract.

### **37-14.1-3. Definitions.**

- (a) "Affirmative action" means taking specific steps to eliminate discrimination and its effects, to ensure nondiscriminatory results and practices in the future, and to involve minority business enterprises fully in contracts and programs funded by the state.
- (b) "Compliance" means the condition existing when a contractor has met and implemented the requirements of this chapter.
- (c) "Contract" means a mutually binding legal relationship or any modification thereof obligating the seller to furnish supplies or services, including construction, and the buyer to pay for them. For purposes of this chapter, a lease is a contract.
- (d) "Contractor" means one who participates, through a contract or subcontract, in any procurement or program covered by this chapter, and includes lessees and material suppliers.
- (e) "Minority" means a person who is a citizen or lawful permanent resident of the United States and who is:
  - (1) Black (a person having origins in any of the black racial groups of Africa);
  - (2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
  - (3) Portuguese (a person of Portuguese, Brazilian, or other Portuguese culture or origin, regardless of race);
  - (4) Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands);
  - (5) American Indian and Alaskan Native (a person having origins in any of the original peoples of North America.); or
  - (6) Members of other groups, or other individuals, found to be economically and socially disadvantaged by the Small Business Administration under section 8(a) of the Small Business Act, as amended [15 U.S.C. 637(a)].
- (f) "Minority business enterprise" or "MBE" means a small business concern, as defined pursuant to section 3 of the federal Small Business Act [15 U.S.C. 632] and implementing regulations, which is owned and controlled by one or more minorities or women. For the purposes of this chapter, owned and controlled means a business.

- (1) Which is at least fifty-one percent (51%) owned by one or more minorities or women or, in the case of a publicly owned business, at least fifty-one percent (51%) of the stock of which is owned by one or more minorities or women; and
- (2) Whose management and daily business operations are controlled by one or more such individuals.

(g) "MBE coordinator" means the official designated to have overall responsibility for promotion of minority business enterprise in his or her departmental element.

(h) "Noncompliance" means the condition existing when a recipient or contractor has failed to implement the requirements of this chapter.

#### **37-14.1-4. Policy.**

It is the policy of the state of Rhode Island that minority business enterprises (MBE's) shall have the maximum opportunity to participate in the performance of procurements and projects outlined in 37-14.1-2.

#### **37-14.1-5. Discrimination prohibited.**

No person shall be excluded from participation in, denied the benefits of, or otherwise discriminated against in connection with the award and performance of any project covered by this chapter, on the grounds of race, color, national origin, or sex.

#### **37-14.1-6. Minority business enterprise participation.**

Minority business enterprises shall be included in all procurements and construction projects under this chapter and shall be awarded a minimum of ten percent (10%) of the dollar value of the entire procurement or project. The director of the department of administration is further authorized to establish by rules and regulation formulas for giving minority business enterprises a preference in contract and subcontract awards.

#### **37-14.1-7. Establishment of criteria and guidelines.**

The director of the department of administration shall establish, by rule and regulations adopted in accordance with chapter 35 of title 42, standards which shall determine whether a construction project is covered by this chapter, compliance formulas, procedures for implementation, and procedures for enforcement which are not inconsistent with 49 CFR 23 of the federal regulations. As to Rhode Island department of transportation contracts, the director of administration may delegate this authority to the director of transportation.

#### **37-14.1-8. Sanctions.**

(a) The director of the department of administration shall have the power to impose sanctions upon contractors not in compliance with this chapter and shall include but not be limited to:

- (1) Suspension of payments;
- (2) Termination of the contract;
- (3) Recovery by the state of ten percent (10%) of the contract award price as liquidated damages; and
- (4) Denial of right to participate in future projects for up to three (3) years.

(b) As to Rhode Island department of transportation contracts, the director of the department of administration may delegate this authority to the director of transportation.

**RHODE ISLAND REQUIREMENTS FOR PARTICIPATION BY MINORITY BUSINESS ENTERPRISES**  
**IN STATE FUNDED AND DIRECTED PUBLIC CONSTRUCTION PROJECTS, CONSTRUCTION**  
**CONTRACTS AND PROCUREMENT CONTRACTS**

In accordance with RI Gen. Law § 37-14.1-1, it is the policy of the State of Rhode Island to support the fullest possible participation of firms owned and controlled by minorities (MBEs) and women (WBEs). Pursuant to §§ 37-14.1-2 and 37-14.1-6, MBEs and WBEs shall be included in all state purchasing, including, but not limited to, the procurement of goods, services, construction projects, or contracts funded in whole or in part with state funds, or funds which, in accordance with a federal grant or otherwise, the state expends or administers. MBEs and WBEs shall be awarded a minimum of ten percent (10%) of the dollar value of the entire procurement or project. MBE participation credit shall only be granted for firms duly certified as MBEs or WBEs by the State of Rhode Island, Department of Administration, Office of Diversity, Equity and Opportunity, MBE Compliance Office (MBECO). The current directory of firms certified as MBEs or WBEs may be accessed at <http://odeo.ri.gov/offices/mbeco/mbe-wbe.php> or by contacting Dorinda Keene at the MBECO at (401) 574-8670 or via email at [Dorinda.Keene@doa.ri.gov](mailto:Dorinda.Keene@doa.ri.gov)

# TITLE 37

## CHAPTER 16 PUBLIC WORKS ARBITRATION

### Sections

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37-16-4.	Stay of legal proceedings pending arbitration.
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37-16-26.	Satisfaction of award.
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### **37-16-1. Short title.**

This chapter shall be known as the "Public Works Arbitration Act".

### **37-16-2. Contract provision for arbitration.**

(a) A provision in a written contract executed on or after January 1, 1962, for the construction, alteration, repair, or painting of any public building, sewer, highway, bridge, water treatment or disposal projects one party to which is the state, a city, a town, or an authority, a board, a public corporation, or any similar body created by statute or ordinance or any committee, agency, or subdivision of any of them, to settle by arbitration any dispute or claim arising out of or concerning the performance or interpretation of the contract shall be valid, irrevocable, and enforceable, save upon grounds existing in law or equity for the revocation of the contract.

(b) (1) Every contract for the construction, alteration, repair, painting, or demolition of any public building, sewer, water treatment or disposal project, highway, or bridge one party to which is the state, a city, a town, or an authority, a board, a public corporation, or any similar body created by statute or ordinance or any committee, agency, or subdivision of any of them which has a contract price of ten thousand dollars (\$ 10,000) or more and which is executed on or after July 1, 1967, shall contain a provision for arbitration of disputes and claims arising out of or concerning the performance or interpretation of the contract as follows:

(2) "All claims, disputes, and other matters in question arising out of or relating to this contract or the performance or interpretation thereof shall be submitted to arbitration. Arbitration shall be commenced by a demand in writing made by one party to the contract upon the other within a reasonable time after the dispute, claim, or other matter in question arose but in no event after payment in full of the contract price has been made and accepted. The written demand shall contain a statement of the question to be arbitrated and a detailed statement of each item or matter in

dispute and the name of the arbitrator appointed by that party. The other party to the contract within ten (10) days of the receipt of the written demand shall appoint an arbitrator and give notice in writing thereof to the party who commenced arbitration. The two (2) arbitrators appointed by the parties shall within ten (10) days of the date of the appointment of the second arbitrator select a third arbitrator who shall be designated as chairperson and who immediately shall give written notice to the parties of his or her appointment. The third arbitrator shall select a time, date, and place for hearing and give each party five (5) days notice in writing thereof. The date for hearing shall not be more than fifteen (15) days after the date of appointment of the third arbitrator. The award shall be made promptly by the arbitrators and, unless otherwise agreed by the parties or specified by law, no later than thirty (30) days from the date of closing the hearing, or, if oral hearings have been waived, from the date of the transmittal of the final statements and proofs to the arbitrators. The award shall be in writing and shall be signed by a majority of the arbitrators. It shall be executed in the manner required by law. The arbitrator shall provide a written explanation of the reasoning for the award. In the event the party of whom arbitration is demanded shall fail to appoint his or her arbitrator within the time specified or the two (2) arbitrators appointed by the parties are unable to agree on an appointment of the third arbitrator within the time specified, either party may petition the presiding justice of the superior court to appoint a single arbitrator who shall hear the parties and make an award as provided herein. The petitioner shall give five (5) days notice in writing to the other party before filing his or her petition."

(c) Any dispute involving claims less than one hundred thousand dollars (\$ 100,000) and associated with construction of a highway or bridge as referred to in subsection (b) shall be submitted to arbitration. Any dispute involving claims of one hundred thousand dollars (\$ 100,000) or more and associated with construction of a highway or bridge as referred to in subsection (b) shall only be arbitrated with the consent of the parties. If the parties fail to consent to arbitration and the state of Rhode Island is a party to the dispute, then the claim will proceed in accordance with § 37-13.1-1.

(d) For the purposes of this section, the term "claims" shall not mean the aggregate amount sought under the contract or in the arbitration, but shall refer specifically to each item or matter in dispute for which additional compensation is sought or for each item for which a credit is sought.

(e) Notwithstanding subsection (a) or (b) of this section, if any contract except for highway and bridge contracts provides for an arbitration procedure, and a method of appointment of an arbitrator or arbitrators, that method shall be followed instead of the method provided in subsection (b) of this section.

(f) This section shall apply to all written contracts executed on or after January 1, 1986.

### **37-16-3. Application to subcontracts.**

When a contract described in 37-16-2 is in effect and any party thereto has entered into a subcontract to perform part of the work and/or furnish any materials in connection with the work described in the contract and the terms of the subcontract provide for arbitration of a dispute or claim concerning the performance or interpretation thereof, or the subcontract, expressly or by reference to the terms of the contract, provides that the parties to the subcontract shall comply with the arbitration provisions of the contract, the following shall apply when a request is made or an order of court is entered for arbitration either under the terms of the contract or subcontract.

(a) When arbitration under the contract may adversely affect the interest of a party thereto because of the effect of an award of the arbitrator or arbitrators upon the performance or interpretation of the terms of a subcontract to which he or she is also a party, he or she may require any other party or all other parties to the subcontract to become a party or parties to the arbitration.

(b) When a party to a subcontract makes a demand or an order of court is entered for arbitration under the terms of the subcontract which comply with the provision of this chapter, any party thereto who is also a party to the contract and whose rights under the contract may be adversely affected by the effect of an award of the arbitrator or arbitrators upon the performance or interpretation of the contract, may require any other party to the contract to become a party to the arbitration.

(c) When a party to a contract or to a subcontract is made a party to arbitration by virtue of the provisions of this section, he or she shall have all the rights of a party to arbitration as provided in this chapter except the appointment of an arbitrator. Provided, however, he or she may object to the arbitrators appointed by the parties in which event a single arbitrator shall be appointed as provided in 37-16-2 in the petition of either of the original parties to arbitration. The award of the arbitrator or arbitrators shall be valid and shall be binding on him or her to

the extent that it affects the performance or interpretation of the contract and/or subcontract to which he or she is a party. The award of the arbitrator or arbitrators may be enforced, modified, or vacated as this chapter provides an award made in an arbitration of a contract described in 37-16-2 may be enforced, modified, or vacated.

#### **37-16-4. Stay of legal proceedings pending arbitration.**

If any suit or proceedings be brought upon any issue referable to arbitration under contract in writing providing for arbitration, the court in which the suit is pending upon being satisfied that the issue involved in the suit or proceedings is referable to arbitration under the contract, shall on application of one of the parties, stay the trial of the action until arbitration has been held.

#### **37-16-5. Jurisdiction of superior court to enforce arbitration provision and awards.**

The entering into a contract in writing providing for arbitration shall be deemed a consent of all parties, including those enumerated in 37-16-2, thereto to the jurisdiction of the superior court of this state to enforce the arbitration provision and any award made pursuant to that provision. A party aggrieved by the failure, neglect, or refusal of another to perform under a contract providing for arbitration, may petition the superior court, or a judge thereof, for an order directing that arbitration proceed in the manner provided for in the contract. Five (5) days' notice in writing of the application shall be served upon the part in default. Service thereof shall be made in the manner specified in the contract, and if no manner specified therein, then in the manner provided by law for personal service of a summons, within or without the state, or substituted service of a summons, or upon satisfactory proof that the party aggrieved has been or will be unable with due diligence to make service in any of the foregoing manners, then notice shall be served in such manner as the court or judge may direct. A judge of the superior court shall hear the parties and upon being satisfied that there is no substantial issue as to the making of the contract or the failure to comply therewith, the court, or the judge thereof, hearing the application, shall make an order directing the parties to proceed to arbitration in accordance with the terms of the contract.

#### **37-16-6. Trial upon evidence of substantial issue.**

If evidentiary facts are set forth raising a substantial issue as to the making of the contract or the failure to comply therewith, the court, or the judge thereof, shall proceed immediately to the trial of the issues. Whenever an immediate trial is ordered, the order therefor shall provide that, if the court finds that a written contract providing for arbitration was made, and that there was a failure to comply therewith, the parties shall proceed with the arbitration in accordance with the terms of the contract and the order shall provide that if the court finds that there was no contract or failure to comply with the contract, then the proceeding shall be dismissed.

#### **37-16-7. Method of appointing arbitrators or umpire.**

If in the contract providing for arbitration, provision is made for a method of naming or appointing an arbitrator or arbitrators or an umpire, that method shall be followed, but if no method be provided therein, then the parties to the contract shall agree to the method of naming or appointing an arbitrator or arbitrators or an umpire and if the parties shall fail to agree, then the court or the judge thereof upon application of either of the parties after due notice to the other party shall appoint an arbitrator to hear the dispute.

#### **37-16-8. Scheduling and notice of arbitration hearing - Adjournment.**

Subject to the terms of the contract, if any are specified therein, the arbitrators selected as prescribed in this chapter must appoint a time and place for the hearing of the matters submitted to them, and must cause notice thereof to be given to each of the parties. They, or a majority of them, may adjourn the hearing from time to time upon the application of either party for good cause shown or upon their own motion, but not beyond the day fixed if a date in the contract, if any, for rendering their award, unless the time so fixed is extended by the written consent of the parties to the contract or their attorney, or the parties have continued with the arbitration without objection to such adjournment.

#### **37-16-9. Power of court to direct prompt hearing.**

The court shall have power to direct the arbitrators to proceed promptly with the hearing and determination of the dispute, claim, or matter in question.

#### **37-16-10. Arbitrator's oath - Waiver.**

Before hearing any testimony, arbitrators selected as prescribed in this chapter must be sworn, by an officer authorized by law to administer an oath, faithfully and fairly to hear and examine the claim, dispute, or matter in question and to make a just award according to the best of their understanding, unless the oath is waived by the



written consent of the parties to the contract or their attorneys or the parties have continued with the arbitration without objection to the failure of the arbitrators to take the oath.

### **37-16-11. Powers of arbitrators.**

The arbitrator or arbitrators selected as prescribed in this chapter, may require any person to attend before them as a witness; and he or she and they have, and each of them has, the same powers with respect to all the proceedings before them which are conferred upon a board or a member of a board authorized by law to hear testimony. All the arbitrators selected as prescribed in this chapter must meet together and hear all the allegations and proofs of the parties; but an award by a majority of them is valid.

### **37-16-12. Fees.**

In any proceeding under this chapter, unless the parties agree as to the arbitrator's or arbitrators' fees, such fees shall be fixed by the court or the judges thereof who shall require the payment equally by both parties of the arbitrators' fees.

### **37-16-13. Validity of awards.**

An award shall be valid and enforceable according to its terms and under the provisions of this chapter, without previous adjudication of the existence of a contract to arbitrate, subject, nevertheless, to the provisions of this section:

- (a) A party who has participated in any of the proceedings before the arbitrator or arbitrators may object to the confirmation of the award only on one or more of the grounds hereinafter specified (provided that he did not continue with the arbitration with notice of the facts or defects upon which his objection is based) because of a failure to comply with 37-16-8 or with 37-16-10 or because of the improper manner of the selection of the arbitrators.
- (b) A party who has not participated in any of the proceedings had before the arbitrator or arbitrators and who has not made or been served with an application to compel arbitration under 37-16-5 may also put in issue the making of the contract or the failure to comply therewith, either by a motion for a stay of the arbitration or in opposition to the confirmation of the award. If a notice shall have been personally served upon such party of an intention to conduct the arbitration pursuant to the provisions of a contract specified in the notice, then the issues specified in this subdivision may be raised only by a motion for a stay of the arbitration, notice of which motion must be served within ten (10) days after the service of the notice of intention to arbitrate. The notice must state in substance that unless within ten (10) days after its service, the party served therewith shall serve a notice of motion to stay the arbitration, he or she shall thereafter be barred from putting in issue the making of the contract or the failure to comply therewith. The arbitration hearing shall be adjourned upon service of the notice pending the determination of the motion. Where the opposing party, either on a motion for a stay or in opposition to the confirmation of an award, sets forth evidentiary facts raising a substantial issue as to the making of the contract or the failure to comply therewith, an immediate trial of the same shall be had. In the event that the party is unsuccessful he or she may, nevertheless, participate in the arbitration if the same is still being carried on.

### **37-16-14. Arbitration under chapter deemed special proceeding - Jurisdiction of superior court.**

Arbitration of a claim, dispute, or matter in question under a contract described in this chapter shall be deemed a special proceeding, of which the superior court for Providence County shall have jurisdiction.

### **37-16-15. Procedure for hearing of application to court.**

Any application to the court, or a judge thereof, hereunder shall be made and heard in the manner provided by law for the making and hearing of motions, except as otherwise herein expressly provided.

### **37-16-16. Form of award.**

To entitle the award to be enforced, as prescribed in this chapter, it must be in writing; and, within the time limited in the contract, if any, subscribed by the arbitrator or arbitrators making it and either filed in the office of the clerk of the court having jurisdiction as provided in 37-16-14 or delivered to one of the parties or his or her attorney.

### **37-16-17. Court order confirming award.**

At any time within one year after the award is made, as prescribed in 37-16-16, any party to the contract by the terms of which arbitration was had, may apply to the court having jurisdiction as provided in 37-16-14 for an order confirming the award. Thereupon the court must grant the order unless the award is vacated, modified, or corrected, as prescribed in 37-16-18 and 37-16-19 or unless the award is unenforceable under the provisions of 37-16-13. Notice of the motion must be served upon the adverse party or parties or his or her or their attorneys, as prescribed by law for service of notice of a motion upon an attorney in an action in the same court.

### **37-16-18. Court order vacating award.**

In any of the following cases, the court must make an order vacating the award, upon the application of any party to the controversy which was arbitrated

- (a) When the award was procured by fraud.
- (b) Where the arbitrator or arbitrators exceeded their powers, or so imperfectly executed them, that a mutual, final, and definite award upon the subject matter submitted was not made.
- (c) If there was no valid contract, and the objection has been raised under the conditions set forth in 37-16-13.

### **37-16-19. Rehearing after vacation of award.**

Where an award is vacated, the court, in its discretion may direct a rehearing either before the same arbitrator or arbitrators or before a new arbitrator or arbitrators to be chosen in the manner provided in the contract for the selection of the original arbitrator or arbitrators or as provided for in 37-16-7 and any provision limiting the time in which the arbitrator or arbitrators may make a decision shall be deemed applicable to the new arbitration and to commence from the date of the court's order.

### **37-16-20. Court order modifying or correcting award.**

In any of the following cases, the court must make an order modifying or correcting the award, upon the application of any party to the contract by the terms of which the arbitration was held.

- (a) Where there was an evident miscalculation of figures or an evident mistake in the description of any persons, thing, or property referred to in the award.
- (b) Where the arbitrator or arbitrators have awarded upon a matter not submitted to them, not affecting the merits of the decision upon the matter submitted.
- (c) Where the award is imperfect in a matter of form not affecting the merits of the controversy, and, if it had been a master's report the defect could have been amended or disregarded by the court.

### **37-16-21. Notice of motion to vacate, modify, or correct an award.**

Notice of a motion to vacate, modify, or correct an award must be served upon all adverse parties, or their attorneys, within sixty (60) days after the award is filed or delivered, as prescribed by law for service of notice of a motion upon an attorney in an action; except that in opposition to a motion to confirm an award, any of the grounds specified in 37-16-18 may be set up. For the purpose of the motion, any judge who might make an order, to stay the proceedings in an action brought in the same court may make an order, to be served with the notice of motion, staying the proceedings of an adverse party or parties to enforce the award.

### **37-16-22. Entry of judgment - Costs.**

Upon the granting of an order confirming, modifying, or correcting an award, judgment may be entered in conformity therewith, except as is otherwise prescribed in this chapter. Costs of the application and of the proceedings subsequent thereto, not exceeding twenty-five dollars (\$25.00) and disbursements, may be awarded by the court in its discretion. If awarded, the amount thereof must be included in the judgment.

### **37-16-23. Filing of papers after judgment.**

(a) Immediately after entering judgment, the clerk must attach together and file the following papers:

- (1) The contract, and each written extension of the time, if any, within which to make the award.
- (2) The award.
- (3) Each notice, affidavit or other paper used upon an application to confirm, modify, or correct the award, and a copy of each order of the court upon the application.
- (4) A copy of the judgment.

(b) The judgment may be docketed as if it was rendered in an action.

### **37-16-24. Effect of judgment.**

The judgment so entered has the same force and effect, in all respects as, and is subject to all the provisions of law relating to a judgment in an action. The judgment may be enforced as if it had been rendered in an action in the court in which it is entered.

### **37-16-25. Appeals.**

An appeal may be taken from an order made in a proceeding under this chapter, or from a judgment entered upon an award. The proceedings upon the appeal, including the judgment thereupon and the enforcement of the judgment, are governed by the provisions of statute and rule regulating appeal in actions as far as they are applicable.

### **37-16-26. Satisfaction of award.**

- (a) An award which requires the payment of a sum of money by a city, town, or the state or any body described in 37-16-2 created or organized by or through the authority of any of them, shall be satisfied to the extent of payment of that sum by payment thereof to the party to whom the award was made by the treasurer or officer exercising the duties of a treasurer thereof from its general funds.
- (b) An award which requires the payment of a sum of money to a city, a town, or the state or any body described in 37-16-2 created or organized by or through the authority of any of them shall be satisfied to the extent of payment of that sum by payment thereof to its treasurer or officer exercising the duties of a treasurer thereof who shall deposit the same in its general funds.

### **37-16-27. Application to sureties.**

- (a) If a contractor principal on a bond furnished to guarantee performance or payment on a construction contract and the claimant are parties to a written contract with a provision to submit to arbitration any controversy thereafter arising under the contract, or subject to arbitration as provided in 37-16-2(b), the arbitration provisions shall apply to the surety for all disputes involving questions of the claimant's right of recovery against the surety. Either the claimant, the contractor principal, or surety may demand arbitration in accordance with the written contract or as provided in 37-16-2(b) if applicable in one arbitration proceeding, provided that the provisions of 37-16-3 shall be applicable to any such demand for arbitration. The arbitration award shall decide all controversies subject to arbitration between the claimant, on the one hand, and the contractor principal and surety on the other hand, including all questions involving liability of the contractor principal and surety on the bond, but a claimant must file suit for recovery against the surety within the time limits set forth in 37-12-2 and 37-12-5. The arbitration shall be in accordance with this chapter and the court shall enter judgment thereon as provided therein.
- (b) The arbitrator or arbitrators, if more than one, shall make findings of fact as to the compliance with the requirements for recovery against the surety, and those findings of fact shall be a part of the award binding on all parties to the arbitration.

# TITLE 45

## CHAPTER 55 AWARD OF MUNICIPAL CONTRACTS

### SECTIONS

- 45-55-1 Legislative findings
- 45-55-2. Method of source selection
- 45-55-3. Purchasing agent - Appointment - Duties.
- 45-55-4. Definitions.
- 45-55-5. Competitive sealed bidding.
- 45-55-5.1. Business exempt.
- 45-55-5.2. Town of North Smithfield - Exemption.
- 45-55-6. Competitive negotiation.
- 45-55-7. Negotiations after unsuccessful competitive sealed bidding
- 45-55-8. Sole source procurement and emergency procurements.
- 45-55-8.1 Qualification based selection of architects and engineers.
- 45-55-9. Small purchases.
- 45-55-10. Cancellation of invitation for bids and requests for proposals.
- 45-55-11. Responsibilities of bidders and offerors
- 45-55-12. Prequalification of contractors - General.
- 45-55-13. Exclusion of state mandated costs.
- 45-55-13.1. Exclusion of multi-cities or towns insurance corporations and cooperative risk management programs.
- 45-55-13.2. Exclusion of multi-cities or towns energy aggregation programs.
- 45-55-13.3. Exclusion of multi-school district combined purchasing consortia
- 45-55-14. Staff consultants.
- 45-55-15. Severability.
- 45-55-16 Prohibition against the use of lead based paints.
- 44-55-17 Penalties

#### **45-55-1. Legislative findings.**

It is hereby declared that a need exists to establish a uniform system for the award of contracts by municipalities, utilizing open cooperative bids.

#### **45-55-2. Method of source selection.**

Except as otherwise authorized by law, all municipal contracts shall be awarded by:

- (1) Competitive sealed bidding, pursuant to 45-55-5;
- (2) Competitive negotiations, pursuant to 45-55-6;
- (3) Non-competitive negotiations, pursuant to 45-55-7 and 45-55-8;
- (4) Small purchase procedures, pursuant to 45-55-9.
- (5) Qualification based selection (QBS) process for architects/engineers pursuant to 45-55-8.1

#### **45-55-3. Purchasing agent - Appointment - Duties.**

Within each city or town or quasi public agency there shall be designated a person or persons to act as purchasing officer to exercise the powers and duties as set forth in this chapter.

#### **45-55-4. Definitions.**

The words defined in this section have the following meanings whenever they appear in this chapter, unless the context in which they are used clearly requires a different meaning or a different definition is prescribed for a particular section, group of sections or provision.

- (1) "Business" means any corporation, partnership, individual, sole proprietorship, joint stock company, joint venture, or any other legal entity through which business is conducted.
- (2) "Change order" means a written order signed by the purchasing agent, or contractor directing or allowing the contractor to make changes which the changes clause of the contract authorizes the purchasing agent or contractor to order without the consent of the contractor or purchasing agent.
- (3) "Construction" means the process of building, altering, repairing, improving, or demolishing any public structures or building, or other public improvements of any kind to any public real property. It does not include the routine maintenance or repair of existing structures, buildings, or real property performed by salaried employees of the municipality in the usual course of their job.
- (4) "Contract" means all types of agreements, including grants and orders, for the purchase or disposal of supplies, services, construction, or any other item. It includes awards; contracts of a fixed-price, cost, cost-plus-a-fixed-fee, or incentive type; contracts providing for the issuance of job or task orders; leases; letter contracts, purchase orders, and construction management contracts. It also includes supplemental agreements with respect to any of the preceding. "Contract" does not include labor contracts with employees of the municipality.
- (5) "Contract modification" means any written alteration in the specifications, delivery point, rate of delivery, contract period, price, quantity, or other contract provisions of any existing contract, whether accomplished by unilateral action in accordance with a contract provision, or by mutual action of the parties to the contract. It includes bilateral actions, as supplemental agreements, and unilateral actions, as change orders, administrative changes, notices of termination, and notices of the exercise of a contract option.
- (6) "Contractor" means any person having a contract with a municipality.
- (8) "Data" means recorded information, regardless of form or characteristic.
- (8) "Designee" means a duly authorized representative of a person holding a superior position.
- (9) "Employee" means an individual drawing a salary from a municipality, whether elected or not, and any non-salaried individual performing personal services for any municipality.
- (10) "May" means permissive.
- (11) "Municipality" means the individual cities and towns of the state of Rhode Island.
- (12) "Negotiation" means contracting by either of the methods described in §§ 45-55-6, 45-55-7, and 45-55-8.
- (13) "Person" means any business, individual, organization, or group of individuals.
- (14) "Procurement" means the purchasing, buying, renting, leasing, or otherwise obtaining of any supplies, services, or construction. It also includes all functions that pertain to the obtaining of any supply, service, or construction item, including description of requirements, selection and solicitation of sources, preparation and award of contract, and all phases of contract administration.
- (15) "Purchasing officer" means the person designated in each municipality or quasi public agency pursuant to section 45-55-3.
- (16) "Regulations" means rules and regulations adopted by the individual cities or towns, concerning the implementation of the provisions of this chapter.

(17) "Services" means the rendering, by a contractor, of its time and effort rather than the furnishing of a specific end product, other than reports which are merely incidental to the required performance of services. "Services" does not include labor contracts with employees of governmental agencies.

(18) "Shall" means imperative.

(19) "Supplemental agreement" means any contract modification which is accomplished by the mutual action of the parties.

(20) "Supplies" means all property, including, but not limited to, leases of real property, printing and insurance, except land or permanent interest in land.

#### **45-55-5. Competitive sealed bidding.**

(a) Contracts exceeding the amount provided by 45-55-9 shall be awarded by competitive bidding unless they are professional engineering/architectural services pursuant to 45-55-8.1 and it is determined in writing that this method is not practicable. Factors to be considered in determining whether competitive sealed bidding is practicable shall include whether:

- (1) Specifications can be prepared that permit award on the basis of either the lowest qualified bid price or the lowest qualified evaluated bid price; and
  - (2) The available sources, the time and place of performance, and other relevant circumstances as are appropriate for the use of competitive sealed bidding.
- (b) The invitation for bids shall state whether award shall be made on the basis of the lowest bid price or the lowest evaluated or responsive bid price. If the latter basis is used, the objective measurable criteria to be utilized shall be stated in the invitation for bids, if available.
- (c) Adequate public notice of the invitation for bids shall be given a sufficient time prior to the date stated in the notice for the opening of bids. Notice may include publication in a newspaper of general circulation in the state as determined by the purchasing officer for the municipality not less than seven (7) days nor more than twenty-one (21) days before the date set for opening of the bids. The purchasing officer may make a written determination that the twenty-one (21) day limitation needs to be waived. The written determination shall state the reason why the twenty-one (21) day limitation is being waived and shall state the number of days, giving a minimum and maximum, before the date set for the opening of bids when public notice is to be given.
- (4) Bids shall be opened publicly in full view of the public at the time and place designated in the invitation for bids. Each bid, together with the name of the bidder, shall be recorded and an abstract made available for public inspection. Subsequent to the awarding of the bid, all documents pertinent to the awarding of the bid shall be made available and open to public inspection and retained in the bid file.
- (5) The contract shall be awarded with reasonable promptness by written notice to the responsive and responsible bidder whose bid is either the lowest bid price, or lowest evaluated or responsive bid price.
- (6) Correction or withdrawal of bids may be allowed only to the extent permitted by regulations issued by the purchasing officer.

#### **45-55-5.1. Business exempt.**

The North Kingstown Bus Contractors Association and the Scituate School Bus Owners Club shall be exempt from the provisions of this chapter.

#### **45-55-5.2. Town of North Smithfield - Exemption.**

The town of North Smithfield is exempt from the provisions of this chapter with regard to the contracting for fire and rescue services with the Primrose Volunteer Fire Department and/or North Smithfield Fire Department and/or their respective successors and assigns.

#### **45-55-6. Competitive negotiation.**

- (a) When, under regulations adopted by the city or town council, the purchasing agent determines in writing that the use of competitive sealed bidding is not practicable, and except as provided in 45-55-8, 45-55-9, and 45-55-10 a contract may be awarded by competitive negotiation.
- (b) Adequate public notice of the request for proposals shall be given in the same manner as provided in 45-55-5(c).
- (c) Contracts may be competitively negotiated when it is determined, in writing, by the purchasing agent that the bid prices received by competitive sealed bidding either are unreasonable as to all or part of the requirements, or were not independently reached in open competition, and for which:
  - (1) Each competitive bidder has been notified of the intention to negotiate and is given reasonable opportunity to negotiate; and
  - (2) The negotiated price is lower than the lowest rejected bid by any competitive bidder; and
  - (3) The negotiated price is the lowest negotiated price offered by a competitive offeror.
- (d) The request for proposals shall indicate the relative importance of price and other evaluation factors.
- (e) Award shall be made to the responsible offeror whose proposal is determined in writing to be the most advantageous to the municipality taking into consideration price and the evaluation factors set forth in the request for proposals.
- (f) Written or oral discussions shall be conducted with all responsible offerors who submit proposals determined, in writing, to be reasonably susceptible of being selected for award. Discussions shall not disclose any information derived from proposals submitted by competing offerors. Discussions need not be conducted:
  - (1) With respect to prices, where such prices are fixed by law or regulation, except that consideration shall be given to competitive terms and conditions; or
  - (2) Where time of delivery or performance will not permit discussions; or
  - (3) Where it can be clearly demonstrated and documented from the existence of adequate competition or accurate prior cost experience with the particular supply, service, or construction item, that acceptance of an initial offer without discussion would result in fair and reasonable prices, and the request for proposals notifies all offerors of the possibility that award may be made on the basis of the initial offers.

#### **45-55-7. Negotiations after unsuccessful competitive sealed bidding.**

- (a) In the event that all bids submitted pursuant to competitive sealed bidding under 45-55-5 result in bid prices in excess of the funds available for the purchase, and the purchasing officer determines in writing:
  - (1) That there are no additional funds available from any source so as to permit an award to the lowest responsive and responsible bidder, and
  - (2) The best interest of the municipality will not permit the delay attendant to a re-solicitation under revised specifications, or for revised quantities, under competitive sealed bidding as provided in 45-55-5, then a negotiated award may be made as stated in subsection (b) or (c) of this section.
- (b) Where there is more than one bidder, competitive negotiations pursuant to 45-55-6, shall be conducted with the three (3) (two (2) if there are only two (2)) bidders determined in writing, to be the lowest responsive and responsible bidders to the competitive sealed bid invitation. Competitive negotiations shall be conducted under the following restrictions:
  - (1) If discussions pertaining to the revision of the specifications or quantities are held with any potential offeror, all other potential offerors shall be afforded an opportunity to take part in the discussions; or

(2) A request for proposals, based upon revised specifications or quantities, shall be issued as promptly as possible, shall provide for an expeditious response to the revised requirements, and shall be awarded upon the basis of the lowest bid price, or lowest evaluated bid price submitted by any responsive and responsible offeror.

(c) When after competitive sealed bidding, it is determined in writing, that there is only one responsive and responsible bidder, a noncompetitive negotiated award may be made with such bidder in accordance with 45-55-8.

#### **45-55-8. Sole source procurement and emergency procurements.**

(a) A contract may be awarded for a supply, service, or construction item without competition when, under published regulations, the purchasing officer determines, in writing, that there is only one source for the required supply, service, or construction item.

(b) Notwithstanding any other provision of this chapter, the purchasing agent may make or authorize others to make emergency procurements when there exists a threat to public health, welfare, or safety under emergency conditions as defined in regulations or where the procurement will be in the best interest of the city as established by properly promulgated rules and regulations; provided, that such emergency procurements shall be made with such competition as is practicable under the circumstances. A written determination of the basis for the emergency, and for the selection of the particular contractor, shall be included in the contract file.

#### **45-55-8.1. Qualification based selection of architects and engineers.**

When the purchasing agent determines that the city or town needs the services of a professional architect or engineer, the purchasing agent shall follow the qualification based selection process for the procurement of architectural and engineering consulting services.

#### **45-55-9. Small purchases.**

Procurements, not to exceed an aggregate amount of ten thousand dollars (\$10,000) for construction and five thousand dollars (\$5,000) for all other purchases may be made in accordance with small purchase regulations promulgated by the municipality. These amounts shall be increased or decreased annually hereafter at the same rate as the Boston Regional Consumer Price Index. Procurement requirements shall not be artificially divided so as to constitute a small purchase under this section. A municipality may further reduce the aggregate purchase amount, as provided for in this section by ordinance.

#### **45-55-10. Cancellation of invitation for bids and requests for proposals.**

An invitation for bids, a request for proposals, or other solicitation may be canceled, or all bids or proposals rejected, if it is determined, in writing, that such action if taken is not in the best interest of the municipality and approved by the chief purchasing officer.

#### **45-55-11. Responsibilities of bidders and offerors.**

(1) A written determination of responsibility of a bidder or offeror shall be made and it shall be made in accordance with regulations issued by the municipality.

A reasonable inquiry to determine the responsibility of a bidder or offeror may be conducted. The failure of a bidder or offeror to promptly supply information in connection with a reasonable inquiry may be grounds for a determination of non-responsibility with respect to a bidder or offeror.

(2) Except as otherwise provided, by law, information furnished by a bidder or offeror pursuant to this section may not be disclosed outside of the purchasing department administering the contract without prior written consent of the bidder or offeror.

#### **45-55-12. Prequalification of contractors - General.**

The municipality may provide for prequalification of suppliers as responsible prospective contractors for particular types of supplies, services, and construction. Municipalities which choose to provide for prequalification of suppliers shall adopt regulations for prequalification in the same manner provided for in the adoption of ordinances in the manner provided for in the legislative or home rule charter of the municipality. Solicitation mailing lists of



potential contractors of supplies, services, and construction shall include but need not be limited to prequalified contractors. Prequalification shall not foreclose a written determination:

- (1) Between the time of the bid opening or receipt of offers and the making of an award, that a prequalified supplier is not responsible; or
- (2) That a supplier who is not prequalified at the time of bid opening or receipt of offers is responsible.

#### **45-55-13. Exclusion of state mandated costs.**

The provisions of 45-13-7 through 45-13-10 do not apply to this section.

#### **45-55-13.1. Exclusion of multi-cities or towns insurance corporations and cooperative risk management programs.**

The provisions of this chapter shall not apply to entities organized pursuant to section 45-5-20.1. Those entities are exempt from all of the provisions of this chapter.

#### **45-55-13.2. Exclusion of multi-cities or towns energy aggregation programs.**

The provisions of this chapter do not apply to entities organized for the purpose of negotiating the purchase of electric power pursuant to § 39-3-1.1, or energy or energy related services. Those entities are exempt from all provisions of this chapter.

#### **45-55-13.3. Exclusion of multi-school district combined purchasing consortia.**

The provisions of this chapter do not apply to purchases and contracts entered into by those consortia established pursuant to § 16-2-9.2, and such entities shall be exempt from all provisions of this chapter.

#### **45-55-14. Staff consultants.**

The procurement of the service of an attorney, physician or dentist by a municipality, is exempt from the provisions of this chapter.

#### **45-55-15. Severability.**

If any one or more sections, clauses, sentences or parts of this chapter are for any reason be adjudged unconstitutional or otherwise invalid in any court, that judgment shall not affect, impair or invalidate the remaining provisions of this chapter but shall be confined in its operation to the specific provisions so held unconstitutional or invalid and the inapplicability or invalidity of any section, clause or provisions of this chapter in any one or more instances or circumstances shall not be taken to affect or prejudice in any way its applicability or validity in any other instance.

#### **45-55-16. Prohibition against the use of lead based paints.**

When purchasing paint products or contracting or subcontracting for painting, construction, improvement, completion, or repair of any public buildings, public road, public bridge, or public construction, all municipalities, as defined by 45-55-4(11), shall be prohibited from the use of lead based paint.

#### **45-55-17. Penalties.**

Any person who knowingly and intentionally violates any provision of this chapter shall be subject to a misdemeanor, punishable by a fine of not more than five hundred dollars (\$500), or by imprisonment for not more than one year, or both.

**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 DBE<sup>1</sup> subcontractor<sup>2</sup> 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

<sup>1</sup> 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.

<sup>2</sup> 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 Participation Form**

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

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<b>Subcontractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

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 DBE<sup>1</sup> subcontractor's<sup>2</sup> 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: <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/ exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown

<sup>1</sup> 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.

<sup>2</sup> 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).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

<b>Subcontractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

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 DBE<sup>1</sup> subcontractors<sup>2</sup> 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:			
<b>Subcontractor Name/ Company Name</b>	<b>Company Address/ Phone/ Email</b>	<b>Est. Dollar Amt</b>	<b>Currently DBE Certified?</b>

\_\_\_\_\_ Continue on back if needed \_\_\_\_\_

<sup>1</sup> 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.

<sup>2</sup> 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).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

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.

# Good Faith Efforts

## What is the Purpose of the Good Faith Efforts?

The Good Faith Efforts are methods employed by all EPA financial assistance agreement recipients to ensure that disadvantaged business enterprises (DBEs) have the opportunity to compete for procurements funded by EPA financial assistance funds.

## What Are the Good Faith Efforts?

- ❖ Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and local government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources.
- ❖ Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- ❖ Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
- ❖ Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
- ❖ Use the services and assistance of the SBA and the Minority Business Development Agency of the Department of Commerce.
- ❖ If the prime contractor awards subcontracts, require the prime contractor to take the steps in paragraphs (a) through (e) of this section.

## What are the New Contract Administration Provisions?

When the DBE rule goes into effect, there are a number of new provisions designed to prevent unfair practices that adversely affect DBEs. Those provisions are as follows:

- ❖ A recipient must require its prime contractor to pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient.
- ❖ A recipient must be notified in writing by its prime contractor prior to any



termination of a DBE subcontractor for convenience by the prime contractor.

- ❖ If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the Six Good Faith Efforts if soliciting a replacement subcontractor.
- ❖ A recipient must require its prime contractor to employ the Six Good Faith Efforts even if the prime contractor has achieved its fair share objectives.

### **What are the New Forms Associated With the New Contract Administration Provisions?**

EPA Form 6100-2 - DBE Program Subcontractor Participation Form. This form gives a DBE subcontractor the opportunity to describe the work the DBE subcontractor received from the prime contractor, how much the DBE subcontractor was paid and any other concerns the DBE subcontractor might have.

EPA Form 6100-3 - DBE Program Subcontractor Performance Form. This form captures an intended subcontractor's description of work to be performed for the prime contractor and the price of the work submitted to the prime.

EPA Form 6100-4 – DBE Program Subcontractor Utilization Form. This form captures the prime's intended use of an identified DBE subcontractor, and the estimated dollar amount of the subcontract.

<b>Form</b>	<b>Requirement</b>	<b>Provided By</b>	<b>Completed By</b>	<b>Submitted To</b>
EPA Form 6100-2	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	EPA DBE Coordinator
EPA Form 6100-3	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	Recipients as part of bid or proposal package
EPA Form 6100-4	Recipients required to have prime contractors complete the form	Recipients	Prime Contractors	Recipients as part of bid or proposal package



**State of Rhode Island and Providence Plantations  
Office of Diversity, Equity and Opportunity (ODEO)  
Minority Business Enterprise Compliance Office  
Minority Business Enterprise Utilization Plan**

Company Name: \_\_\_\_\_

Representative's Name who administers MBE Program: \_\_\_\_\_

Street Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_ Telephone: \_\_\_\_\_

Email: \_\_\_\_\_ Project Location: \_\_\_\_\_

Bid or Project #: \_\_\_\_\_ Date Bid Opened: \_\_\_\_\_

Description of Work: \_\_\_\_\_

Contract Value: \_\_\_\_\_ MBE % Assigned: \_\_\_\_\_

Total # of All Subcontractors/Suppliers used: \_\_\_\_\_ # of MBE Subcontractors/Suppliers used: \_\_\_\_\_

**List All Subcontractors/Suppliers/Consultants/Independent Contractors – Total Dollar Amounts – Scope of Work:**

<b>Subcontractor / Supplier</b>	<b>Dollar Award</b>	<b>Scope/Description of Work</b>	<b>RI Certified M/WBE Yes/No</b>

Please note that all MBE/WBE firms must be certified by the RI MBE Compliance Office, and that MBE/WBE firms must self-perform 100% of the work with their own forces or subcontract to another RI certified MBE/WBE in order to receive participation credit. Vendors may count 60% of expenditures for materials and supplies obtained from an MBE certified as a regular dealer/supplier, and 100% of such expenditures obtained from an MBE/WBE certified as a manufacturer. For firms certified as a broker, you may receive MBE participation credit only for the fees and commissions charged for the procurement of the good and materials, but not the cost of the materials themselves.

The above referenced contract will not be released until this plan has been approved by the Director of the Department of Administration or its designee.

For assistance and advice in identifying MBE/WBE firms, please call the Minority Business Enterprise Compliance Office at (401) 574-8670. The directory of all certified MBE firms is also located at <http://odeo.ri.gov/>.

Signature of Authorized Agent of Business: \_\_\_\_\_ Date: \_\_\_\_\_

**Send Completed Form to:**  
**Dorinda Keene, Assistant Administrator - MBE**  
**Office of Diversity, Equity and Opportunity (ODEO)**  
**Minority Business Enterprise Compliance Office**  
**One Capitol Hill, 3rd Floor**  
**Providence, RI 02908**  
**Phone: (401) 574-8670**  
[Dorinda.Keene@doa.ri.gov](mailto:Dorinda.Keene@doa.ri.gov)

**Office of Diversity, Equity and Opportunity (ODEO)**  
**MBE Compliance Office**  
**1 Capitol Hill, 3<sup>rd</sup> Floor**  
**Providence, RI 02908**

**(401) 574-8670**  
[www.mbe.ri.gov](http://www.mbe.ri.gov)

Pursuant to RIGL 37-14.1 as well as the regulations promulgated thereto, the MBE Compliance Office requires that you complete the following table. Please note that these figures will be verified with the MBEs identified. If there are outstanding issues, such as retainage or a dispute, please indicate and attach supporting documentation for same. Also note that copies of invoice and cancelled checks for payment to all MBE subcontractors and suppliers are required.

**Contractor/Vendor Name:**

**Project Name & Location:**

**Original Prime Contract Amount: \$ \_\_\_\_\_ Current Prime Contract Amount: \$ \_\_\_\_\_ % Complete: \_\_\_\_\_**

<b>MBE/WBE Subcontractor</b>	<b>Original Contract Amount</b>	<b>Change Orders</b>	<b>Revised Contract Value</b>	<b>% Completed To Date</b>	<b>Amount Paid To Date</b>	<b>Amount Due</b>	<b>Retainage %</b>	<b>Retainage Amount</b>	<b>Explanation</b>

I declare, under penalty of perjury, that the information provided in this verification form and supporting documents is true and correct.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

Notary Certificate:

Sworn before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Notary Signature

\_\_\_\_\_  
Commission Expires

THIS PROJECT IS FUNDED BY THE



# STATE REVOLVING FUND

JOINTLY ADMINISTERED BY THE

**Rhode Island  
Infrastructure Bank**

Vahid Ownjazayeri  
Chair

Jeffrey R. Diehl  
Executive Director



**State of Rhode Island  
Department of Health**

Daniel J. McKee  
Governor

Nicole Alexander-Scott,  
MD, MPH, Director - RIDOH



*"Dedicated To Protecting And Preserving Our State's Most Important Resource...Clean Water"*



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**State of Rhode Island  
Department of Health**

Daniel J. McKee  
Governor

Nicole Alexander-Scott,  
MD, MPH, Director - RIDOH



*"Dedicated To Protecting And Preserving Our State's Most Important Resource...Clean Water"*

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Navy Blue

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Navy Blue

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Executive Director



**State of Rhode Island  
Department of Health**

Daniel J. McKee  
Governor

Nicole Alexander-Scott,  
MD, MPH, Director - RIDOH



*"Dedicated To Protecting And Preserving Our State's Most Important Resource...Clean Water"*

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## DAVIS-BACON PREVAILING WAGE REQUIREMENTS

### (a) GENERAL CONTRACT AND SUBCONTRACT PROVISIONS

For 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 treatment work under the CWSRF or a construction project under the DWSRF 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 or the FY 2010 appropriation, the following clauses shall be inserted in full:

#### (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.

Wage determinations may be obtained from the U.S. Department of Labor's website, [www.dol.gov](http://www.dol.gov).

(ii)(A) The Owner, on behalf of the 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 State 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 Owner agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the Owner to the State award official. The State award official will transmit the request to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. 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 Owner 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 request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination 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.

(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 Owner, 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 Owner, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the Owner 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 submitted 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 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 <http://www.dol.gov/esa/whd/forms/wh347instr.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 owner 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 Owner.

(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 (write in the name of the Federal agency) may by appropriate instructions require, 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 the Owner, the 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.

## **(b) CONTRACT WORK HOURS AND SAFETY STANDARDS ACT**

For 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, the following clauses set forth in paragraphs (b) (1), (2), (3) and (4) of this section shall be inserted in full. These clauses shall be inserted in addition to the clauses required in Section (a), 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 (b)(1) of this section the contractor and any subcontractor responsible therefor 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 (b)(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 (b)(1) of this section.

### **(3) Withholding for Unpaid Wages and Liquidated Damages**

The Owner, 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 (b)(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 (b)(1) through (4) of this section.

### **(c) MAINTENANCE OF RECORDS**

In addition to the clauses contained in Section (a), 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 §5.1 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. 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 Owner, the State, EPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

### **(d) COMPLIANCE VERIFICATION**

(1) The Owner 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 Owner must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(2) The Owner 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. At a minimum, the Owner should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Owners must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB . Owners shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(3) The Owner 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 Owner 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, if practicable, the Owner should 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 . Owners 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 Owner shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(4) The Owner 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.

(5) Owners 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 <http://www.dol.gov/esa/contacts/whd/america2.htm>.

"General Decision Number: RI20210001 12/10/2021

Superseded General Decision Number: RI20200001

State: Rhode Island

Construction Types: Building, Heavy (Heavy and Marine) and Highway

Counties: Rhode Island Statewide.

BUILDING CONSTRUCTION PROJECTS (does not include residential construction consisting of single family homes and apartments up to and including 4 stories) HEAVY, HIGHWAY AND MARINE CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was 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 \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	01/22/2021
2	03/05/2021
3	04/09/2021
4	04/23/2021
5	06/18/2021
6	07/30/2021
7	09/10/2021
8	09/17/2021
9	10/15/2021
10	11/05/2021
11	12/10/2021

ASBE0006-006 12/01/2019

Rates Fringes

HAZARDOUS MATERIAL HANDLER  
(Includes preparation, wetting, stripping, removal



scrapping, vacuuming, bagging  
& disposing of all insulation  
materials, whether they  
contain asbestos or not, from  
mechanical systems).....\$ 36.60                    22.40

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ASBE0006-008 09/01/2021

Rates                    Fringes

Asbestos Worker/Insulator  
Includes application of  
all insulating materials,  
protective coverings,  
coatings & finishes to all  
types of mechanical systems.\$ 45.00                    32.89

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BOIL0029-001 01/01/2021

Rates                    Fringes

BOILERMAKER.....\$ 45.87                    29.02

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BRRIO003-001 06/01/2020

Rates                    Fringes

Bricklayer, Stonemason,  
Pointer, Caulker & Cleaner.....\$ 42.55                    28.02

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BRRIO003-002 03/01/2020

Rates                    Fringes

Marble Setter, Terrazzo  
Worker & Tile Setter.....\$ 40.78                    28.92

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BRRIO003-003 03/01/2020

Rates                    Fringes

Marble, Tile & Terrazzo  
Finisher.....\$ 34.10                    27.88

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CARP0330-001 01/01/2021

Rates                    Fringes

CARPENTER (Includes Soft  
Floor Layer).....\$ 39.72                    28.66  
Diver Tender.....\$ 40.72                    28.66  
DIVER.....\$ 51.47                    28.66  
Piledriver.....\$ 39.72                    28.66  
WELDER.....\$ 40.72                    28.66

FOOTNOTES:

When not diving or tending the diver, the diver and diver  
tender shall receive the piledriver rate. Diver tenders  
shall receive \$1.00 per hour above the pile driver rate  
when tending the diver.

Work on free-standing stacks, concrete silos & public utility  
electrical power houses, which are over 35 ft. in height  
when constructed: \$.50 per hour additional.

Work on exterior concrete shear wall gang forms, 45 ft. or more above ground elevation or on setback: \$.50 per hour additional.

The designated piledriver, known as the ""monkey"": \$1.00 per hour additional.

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CARP1121-002 01/06/2020

	Rates	Fringes
MILLWRIGHT.....	\$ 39.07	29.15

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ELEC0099-002 06/02/2021

	Rates	Fringes
ELECTRICIAN.....	\$ 43.61	54.71%
Teledata System Installer.....	\$ 32.71	12.57%+14.93

FOOTNOTES:

Work of a hazardous nature, or where the work height is 30 ft. or more from the floor, except when working OSHA-approved lifts: 20% per hour additional.

Work in tunnels below ground level in combined sewer outfall: 20% per hour additional.

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ELEV0039-001 01/01/2021

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 55.03	35.825+A+B

FOOTNOTES:

A. PAID HOLIDAYS: New Years Day; Memorial Day; Independence Day; Labor Day; Veterans' Day; Thanksgiving Day; the Friday after Thanksgiving Day; and Christmas Day.

B. Employer contributes 8% basic hourly rate for 5 years or more of service of 6% basic hourly rate for 6 months to 5 years of service as vacation pay credit.

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\* ENGI0057-001 12/01/2021

	Rates	Fringes
Operating Engineer: (power plants, sewer treatment plants, pumping stations, tunnels, caissons, piers, docks, bridges, wind turbines, subterranean & other marine and heavy construction work)		
GROUP 1.....	\$ 43.55	28.25+a
GROUP 2.....	\$ 41.55	28.25+a
GROUP 3.....	\$ 37.17	28.25+a
GROUP 4.....	\$ 34.32	28.25+a

GROUP 5.....	\$ 40.60	28.25+a
GROUP 6.....	\$ 31.40	28.25+a
GROUP 7.....	\$ 25.40	28.25+a
GROUP 8.....	\$ 37.25	28.25+a
GROUP 9.....	\$ 41.17	28.25+a

a. BOOM LENGTHS, INCLUDING JIBS:

- 150 feet and over + \$ 2.00
- 180 feet and over + \$ 3.00
- 210 feet and over + \$ 4.00
- 240 feet and over + \$ 5.00
- 270 feet and over + \$ 7.00
- 300 feet and over + \$ 8.00
- 350 feet and over + \$ 9.00
- 400 feet and over + \$10.00

a. PAID HOLIDAYS:

New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

a. FOOTNOTES:

Hazmat work: \$2.00 per hour additional.  
Tunnel/Shaft work: \$5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks

GROUP 2: Digging machine, Ross Carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, graders, front end loader (3 yds. and over), vibratory hammer & vacuum truck, roadheaders, forklifts, economobile type equipment, tunnel boring machines, concrete pump and on site concrete plants.

GROUP 3: Oilers on cranes.

GROUP 4: Oiler on crawler backhoe.

GROUP 5: Bulldozer, bobcats, skid steer loader, tractor, scraper, combination loader backhoe, roller, front end loader (less than 3 yds.), street and mobile-powered sweeper (3-yd. capacity), 8-ft. sweeper minimum 65 HP).

GROUP 6: Well-point installation crew.

GROUP 7: Utility Engineers and Signal Persons

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator and light plant, gas and electric driven pump and air compressor.

GROUP 9: Boat & tug operator.

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ENGI0057-002 11/01/2021

Rates                      Fringes

Power Equipment Operator

(highway construction projects; water and sewerline projects which are incidental to highway construction projects; and bridge projects that do not span water)

GROUP 1.....	\$ 36.70	28.25+a
GROUP 2.....	\$ 31.40	28.25+a
GROUP 3.....	\$ 25.40	28.25+a
GROUP 4.....	\$ 31.98	28.25+a
GROUP 5.....	\$ 35.68	28.25+a
GROUP 6.....	\$ 35.30	28.25+a
GROUP 7.....	\$ 30.95	28.25+a
GROUP 8.....	\$ 32.33	28.25+a
GROUP 9.....	\$ 34.28	28.25+a

a. FOOTNOTE: a. Any employee who works three days in the week in which a holiday falls shall be paid for the holiday.

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Digging machine, crane, piledriver, lighter, locomotive, derrick, hoist, boom truck, John Henry's, directional drilling machine, cold planer, reclaimers, paver, spreader, grader, front end loader (3 yds. and over), vacuum truck, test boring machine operator, veemere saw, water blaster, hydro-demolition robot, forklift, economobile, Ross Carrier, concrete pump operator and boats

GROUP 2: Well point installation crew

GROUP 3: Utility engineers and signal persons

GROUP 4: Oiler on cranes

GROUP 5: Combination loader backhoe, front end loader (less than 3 yds.), forklift, bulldozers & scrapers and boats

GROUP 6: Roller, skid steer loaders, street sweeper

GROUP 7: Gas and electric drive heater, concrete mixer, light plant, welding machine, pump & compressor

GROUP 8: Stone crusher

GROUP 9: Mechanic & welder

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\* ENGI0057-003 12/01/2021

BUILDING CONSTRUCTION

	Rates	Fringes
Power Equipment Operator		
GROUP 1.....	\$ 42.82	28.25+a
GROUP 2.....	\$ 40.82	28.25+a
GROUP 3.....	\$ 40.60	28.25+a
GROUP 4.....	\$ 36.60	28.25+a
GROUP 5.....	\$ 33.75	28.25+a
GROUP 6.....	\$ 39.90	28.25+a

GROUP 7.....	\$ 39.47	28.25+a
GROUP 8.....	\$ 36.79	28.25+a

a. BOOM LENGTHS, INCLUDING JIBS:

- 150 ft. and over: + \$ 2.00
- 180 ft. and over: + \$ 3.00
- 210 ft. and over: + \$ 4.00
- 240 ft. and over: + \$ 5.00
- 270 ft. and over: + \$ 7.00
- 300 ft. and over: + \$ 8.00
- 350 ft. and over: + \$ 9.00
- 400 ft. and over: + \$10.00

a. PAID HOLIDAYS: New Year's Day, President's Day, Memorial Day, July Fourth, Victory Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day & Christmas Day. a: Any employee who works 3 days in the week in which a holiday falls shall be paid for the holiday.

- a. FOOTNOTE: Hazmat work: \$2.00 per hour additional.  
Tunnel/Shaft work: \$5.00 per hour additional.

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Cranes, lighters, boom trucks and derricks.

GROUP 2: Digging machine, Ross carrier, locomotive, hoist, elevator, bidwell-type machine, shot & water blasting machine, paver, spreader, front end loader (3 yds. and over), vibratory hammer and vacuum truck

GROUP 3: Telehandler equipment, forklift, concrete pump & on-site concrete plant

GROUP 4: Fireman & oiler on cranes

GROUP 5: Oiler on crawler backhoe

GROUP 6: Bulldozer, skid steer loaders, bobcats, tractor, grader, scraper, combination loader backhoe, roller, front end loader (less than 3 yds.), street and mobile powered sweeper (3 yds. capacity), 8-ft. sweeper (minimum 65 hp)

GROUP 7: Well point installation crew

GROUP 8: Heater, concrete mixer, stone crusher, welding machine, generator for light plant, gas and electric driven pump & air compressor

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IRON0037-001 09/16/2021

	Rates	Fringes
IRONWORKER.....	\$ 38.21	30.58

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LABO0271-001 05/30/2021

BUILDING CONSTRUCTION

	Rates	Fringes
LABORER		

GROUP 1.....	\$ 33.55	26.15
GROUP 2.....	\$ 33.80	26.15
GROUP 3.....	\$ 34.30	26.15
GROUP 4.....	\$ 34.55	26.15
GROUP 5.....	\$ 35.55	26.15

LABORERS CLASSIFICATIONS

GROUP 1: Laborer, Carpenter Tender, Mason Tender, Cement Finisher Tender, Scaffold Erector, Wrecking Laborer, Asbestos Removal [Non-Mechanical Systems]

GROUP 2: Asphalt Raker, Adzemen, Pipe Trench Bracer, Demolition Burner, Chain Saw Operator, Fence & Guard Rail Erector, Setter of Metal Forms for Roadways, Mortar Mixer, Pipelayer, Riprap & Dry Stonewall Builder, Highway Stone Spreader, Pneumatic Tool Operator, Wagon Drill Operator, Tree Trimmer, Barco-Type Jumping Tamper, Mechanical Grinder Operator

GROUP 3: Pre-Cast Floor & Roof Plank Erectors

GROUP 4: Air Track Operator, Hydraulic & Similar Self-Powered Drill, Block Paver, Rammer, Curb Setter, Powderman & Blaster

GROUP 5: Toxic Waste Remover

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LAB00271-002 05/30/2021

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
LABORER		
COMPRESSED AIR		
Group 1.....	\$ 53.45	24.15
Group 2.....	\$ 50.98	24.15
Group 3.....	\$ 40.50	24.15
FREE AIR		
Group 1.....	\$ 44.05	24.15
Group 2.....	\$ 43.05	24.15
Group 3.....	\$ 40.50	24.15
LABORER		
Group 1.....	\$ 33.55	24.15
Group 2.....	\$ 33.80	24.15
Group 3.....	\$ 34.55	24.15
Group 4.....	\$ 27.05	24.15
Group 5.....	\$ 35.55	24.15
OPEN AIR CAISSON, UNDERPINNING WORK AND BORING CREW		
Bottom Man.....	\$ 39.55	24.15
Top Man & Laborer.....	\$ 38.60	24.15
TEST BORING		
Driller.....	\$ 40.00	24.15
Laborer.....	\$ 38.60	24.15

LABORER CLASSIFICATIONS

GROUP 1: Laborer; Carpenter tender; Cement finisher tender; Wrecking laborer; Asbestos removers [non-mechanical systems]; Plant laborer; Driller in quarries

GROUP 2: Adzeperson; Asphalt raker; Barcotype jumping

tamper; Chain saw operators; Concrete and power buggy operator; Concrete saw operator; Demolition burner; Fence and guard rail erector; Highway stone spreader; Laser beam operator; Mechanical grinder operator; Mason tender; Mortar mixer; Pneumatic tool operator; Riprap and dry stonewall builder; Scaffold erector; Setter of metal forms for roadways; Wagon drill operator; Wood chipper operator; Pipelayer; Pipe trench bracer

GROUP 3: Air track drill operator; Hydraulic and similar powered drills; Brick paver; Block paver; Rammer and curb setter; Powderperson and blaster

GROUP 4: Flagger & signaler

GROUP 5: Toxic waste remover

LABORER - COMPRESSED AIR CLASSIFICATIONS

GROUP 1: Mucking machine operator, tunnel laborer, brake person, track person, miner, grout person, lock tender, gauge tender, miner: motor person & all others in compressed air

GROUP 2: Change house attendant, powder watchperson, top person on iron

GROUP 3: Hazardous waste work within the ""HOT"" zone

LABORER - FREE AIR CLASSIFICATIONS

GROUP 1: Grout person - pumps, brake person, track person, form mover & stripper (wood & steel), shaft laborer, laborer topside, outside motorperson, miner, conveyor operator, miner welder, heading motorperson, erecting operator, mucking machine operator, nozzle person, rodperson, safety miner, shaft & tunnel, steel & rodperson, mole nipper, concrete worker, form erector (wood, steel and all accessories), cement finisher (this type of work only), top signal person, bottom person (when heading is 50' from shaft), burner, shield operator and TBM operator

GROUP 2: Change house attendant, powder watchperson

GROUP 3: Hazardous waste work within the ""HOT"" zone

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PAIN0011-005 06/01/2021

	Rates	Fringes
PAINTER		
Brush and Roller.....	\$ 36.42	22.90
Epoxy, Tanks, Towers, Swing Stage & Structural Steel.....	\$ 38.42	22.90
Spray, Sand & Water Blasting.....	\$ 39.42	22.90
Taper.....	\$ 37.17	22.90
Wall Coverer.....	\$ 36.92	22.90

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PAIN0011-006 06/01/2021

Rates	Fringes
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GLAZIER.....\$ 39.98 22.90

FOOTNOTES:

SWING STAGE: \$1.00 per hour additional.

PAID HOLIDAYS: Labor Day & Christmas Day.

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PAIN0011-011 06/01/2021

	Rates	Fringes
Painter (Bridge Work).....	\$ 54.00	22.90

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PAIN0035-008 06/01/2011

	Rates	Fringes
Sign Painter.....	\$ 24.79	13.72

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PLAS0040-001 06/03/2019

BUILDING CONSTRUCTION

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 36.00	27.15

FOOTNOTE: Cement Mason: Work on free swinging scaffolds under 3 planks width and which is 20 or more feet above ground and any offset structure: \$.30 per hour additional.

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PLAS0040-002 07/01/2019

HEAVY AND HIGHWAY CONSTRUCTION

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 32.85	22.20

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PLAS0040-003 07/01/2019

	Rates	Fringes
PLASTERER.....	\$ 37.55	27.50

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PLUM0051-002 08/30/2021

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 46.49	31.40

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\* ROOF0033-004 12/01/2021

	Rates	Fringes
ROOFER.....	\$ 40.40	29.06

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SFRI0669-001 04/01/2021

	Rates	Fringes
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SPRINKLER FITTER.....\$ 47.55 26.60

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SHEE0017-002 12/01/2020

Rates Fringes  
Sheet Metal Worker.....\$ 38.58 36.73

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TEAM0251-001 05/01/2019

HEAVY AND HIGHWAY CONSTRUCTION

Rates Fringes  
TRUCK DRIVER  
GROUP 1.....\$ 27.96 26.8525+A+B+C  
GROUP 2.....\$ 27.61 26.8525+A+B+C  
GROUP 3.....\$ 27.66 26.8525+A+B+C  
GROUP 4.....\$ 27.71 26.8525+A+B+C  
GROUP 5.....\$ 27.81 26.8525+A+B+C  
GROUP 6.....\$ 28.21 26.8525+A+B+C  
GROUP 7.....\$ 28.41 26.8525+A+B+C  
GROUP 8.....\$ 27.91 26.8525+A+B+C  
GROUP 9.....\$ 28.16 26.8525+A+B+C  
GROUP 10.....\$ 27.96 26.8525+A+B+C

FOOTNOTES:

A. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, plus Presidents' Day, Columbus Day, Veteran's Day & V-J Day, providing the employee has worked at least one day in the calendar week in which the holiday falls.

B. Employee who has been on the payroll for 1 year or more but less than 5 years and has worked 150 Days during the last year of employment shall receive 1 week's paid vacation; 5 to 10 years - 2 weeks' paid vacation; 10 or more years - 3 week's paid vacation.

C. Employees on the seniority list shall be paid a one hundred dollar (\$100.00) bonus for every four hundred (400) hours worked, up to a maximum of five hundred dollars (\$500.00)

All drivers working on a defined hazard material job site shall be paid a premium of \$2.00 per hour over applicable rate.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Pick-up trucks, station wagons, & panel trucks

GROUP 2: Two-axle on low beds

GROUP 3: Two-axle dump truck

GROUP 4: Three-axle dump truck

GROUP 5: Four- and five-axle equipment

GROUP 6: Low-bed or boom trailer.

GROUP 7: Trailers when used on a double hook up (pulling 2 trailers)

GROUP 8: Special earth-moving equipment, under 35 tons

GROUP 9: Special earth-moving equipment, 35 tons or over

GROUP 10: Tractor trailer

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

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)).

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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.

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#### 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.

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END OF GENERAL DECISION"

## DAVIS-BACON ACT QUESTIONNAIRE

Bristol County Water Authority  
Child Street Water Main Replacement  
Pare Project No. 08146.22

1. Will there be any laborers, mechanics, or other employees assigned to this project that are not covered in one of the labor categories on the attached Davis-Bacon Wage Determination form?
2. If yes, please list those labor categories. Pare will request a wage rate determination from the Federal Department of Labor. These labor categories not included on the attached Davis-Bacon form will be paid in accordance with the wage rates determined by the Federal Department of Labor.

# DEBARMENT & SUSPENSION

## Executive Order 12549--Debarment and Suspension

**Source:** The provisions of Executive Order 12549 of Feb. 18, 1986, appear at 51 FR 6370, 3 CFR, 1986 Comp., p. 189, unless otherwise noted.

By the authority vested in me as President by the Constitution and laws of the United States of America, and in order to curb fraud, waste, and abuse in Federal programs, increase agency accountability, and ensure consistency among agency regulations concerning debarment and suspension of participants in Federal programs, it is hereby ordered that:

**Section 1.** (a) To the extent permitted by law and subject to the limitations in Section 1(c), Executive departments and agencies shall participate in a system for debarment and suspension from programs and activities involving Federal financial and nonfinancial assistance and benefits. Debarment or suspension of a participant in a program by one agency shall have government-wide effect.

(b) Activities covered by this Order include but are not limited to: grants, cooperative agreements, contracts of assistance, loans, and loan guarantees.

(c) This Order does not cover procurement programs and activities, direct Federal statutory entitlements or mandatory awards, direct awards to foreign governments or public international organizations, benefits to an individual as a personal entitlement, or Federal employment.

**Sec. 2.** To the extent permitted by law, Executive departments and agencies shall:

(a) Follow government-wide criteria and government-wide minimum due process procedures when they act to debar or suspend participants in affected programs.

(b) Send to the agency designated pursuant to Section 5 identifying information concerning debarred and suspended participants in affected programs, participants who have agreed to exclusion from participation, and participants declared ineligible under applicable law, including Executive Orders. This information shall be included in the list to be maintained pursuant to Section 5.

(c) Not allow a party to participate in any affected program if any Executive department or agency has debarred, suspended, or otherwise excluded (to the extent specified in the exclusion agreement) that party from participation in an affected program. An agency may grant an exception permitting a debarred, suspended, or excluded party to participate in a particular transaction upon a written determination by the agency head or authorized designee stating the reason(s) for deviating from this Presidential policy. However, I intend that exceptions to this policy should be granted only infrequently.

**Sec. 3.** Executive departments and agencies shall issue regulations governing their implementation of this Order that shall be consistent with the guidelines issued under Section 6. Proposed regulations shall be submitted to the Office of Management and Budget for review within four months of the date of the guidelines issued under Section 6. The Director of the Office of Management and Budget may return for reconsideration proposed regulations that the Director believes are inconsistent with the guidelines. Final regulations shall be published within twelve months of the date of the guidelines.

**Sec. 4.** There is hereby constituted the Interagency Committee on Debarment and Suspension, which shall monitor implementation of this Order. The Committee shall consist of representatives of agencies designated by the Director of the Office of Management and Budget.

**Sec. 5.** The Director of the Office of Management and Budget shall designate a Federal agency to perform the following functions: maintain a current list of all individuals and organizations excluded from program participation under this Order, periodically distribute the list to Federal agencies, and study the feasibility of automating the list; coordinate with the lead agency responsible for government-wide debarment and suspension of contractors; chair the Interagency Committee established by Section 4; and report periodically to the Director on implementation of this Order, with the first report due within two years of the date of the Order.

**Sec. 6.** The Director of the Office of Management and Budget is authorized to issue guidelines to Executive departments and agencies that govern which programs and activities are covered by this Order, prescribe government-wide criteria and government-wide minimum due process procedures, and set forth other related details for the effective administration of the guidelines.

**Sec. 7.** The Director of the Office of Management and Budget shall report to the President within three years of the date of this Order on Federal agency compliance with the Order, including the number of exceptions made under Section 2(c), and shall make recommendations as are appropriate further to curb fraud, waste, and abuse.

### **Implementation in the SRF Programs**

A company or individual who is debarred or suspended cannot participate in primary and lower-tiered covered transactions. These transactions include SRF loans and contracts and subcontracts awarded with SRF loan funds.

Under 40 C.F.R. 32.510, the SRF agency must submit a certification stating that it shall not knowingly enter into any transaction with a person who is proposed for debarment, suspended, declared ineligible, or voluntarily excluded from participation in the SRF program. This certification is reviewed by the EPA regional office before the capitalization grant is awarded.

A recipient of SRF assistance directly made available by capitalization grants must provide a certification that it will not knowingly enter into a contract with anyone who is ineligible under the regulations to participate in the project. Contractors on the project have to provide a similar certification prior to the award of a contract and subcontractors on the project have to provide the general contractor with the certification prior to the award of any subcontract.

In addition to actions taken under 40 C.F.R. Part 32, there are a wide range of other sanctions that can render a party ineligible to participate in the SRF program. Lists of debarred, suspended and otherwise ineligible parties are maintained by the General Services Administration and should be checked by the SRF agency and all recipients of funds directly made available by capitalization grants to ensure the accuracy of certifications.

### **Additional References**

C 40 C.F.R. Part 32: EPA Regulations on Debarment and Suspension.

**CERTIFICATION REGARDING DEBARMENT & SUSPENSION  
AND OTHER RESPONSIBILITY MATTERS**

In accordance with the Executive Order 12549, the prospective primary participant certifies to the best of his / her knowledge and belief, that its principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or agency;
- b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offence in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state, or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification.
- d. Have not within a three-year period preceding this application / proposal had one or more public transactions (federal, state, or local) terminated for cause of default.
- e. Acknowledge that all sub-contractors selected for this project must be in compliance with paragraphs (1) (a – d) of this certification.

\_\_\_\_\_  
Name and Title of Authorized Agent

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Authorized Agent

\_\_\_\_\_ I am unable to certify to the above statements. My explanation is attached.





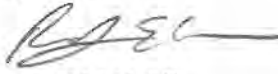
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

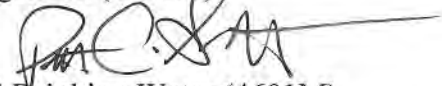
MAR 20 2014

OFFICE OF WATER

**MEMORANDUM**

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76,  
Consolidated Appropriations Act, 2014

FROM: <sup>For</sup> Andrew D. Sawyers, Director   
Office of Wastewater Management (4201M)

Peter C. Grevatt, Director   
Office of Ground Water and Drinking Water (4601M)

TO: Water Management Division Directors  
Regions I - X

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an “American Iron and Steel (AIS)” requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use iron and steel products that are produced in the United States for projects for the construction, alteration, maintenance, or repair of a public water system or treatment works if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Federal Fiscal Year 2014.

Section 436 also sets forth certain circumstances under which EPA may waive the AIS requirement. Furthermore, the Act specifically exempts projects where engineering plans and specifications were approved by a State agency prior to January 17, 2014.

The approach described below explains how EPA will implement the AIS requirement. The first section is in the form of questions and answers that address the types of projects that must comply with the AIS requirement, the types of products covered by the AIS requirement, and compliance. The second section is a step-by-step process for requesting waivers and the circumstances under which waivers may be granted.

## Implementation

The Act states:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term “iron and steel products” means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the “Administrator”) finds that—

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out

the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

### **Project Coverage**

#### **1) What classes of projects are covered by the AIS requirement?**

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

#### **2) Does the AIS requirement apply to nonpoint source projects or national estuary projects?**

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 212 of the Clean Water Act.

#### **3) Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?**

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17, 2014, is excluded from the AIS requirements.

#### **4) What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?**

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

**5) What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?**

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

**6) What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?**

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

**7) What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?**

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

**8) What if a project has split funding from a non-SRF source?**

Many States intend to fund projects with “split” funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A “project” consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger

project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

**9) What about refinancing?**

If a project began construction, financed from a non-SRF source, prior to January 17, 2014, but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014. There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

**10) Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?**

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12)

**Covered Iron and Steel Products**

**11) What is an iron or steel product?**

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following 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 in more detail below);
- Hydrants;
- Tanks;
- Flanges;
- Pipe clamps and restraints;
- Valves;
- Structural steel (defined in more detail below);
- Reinforced precast concrete; and
- Construction materials (defined in more detail below).

**12) What does the term ‘primarily iron or steel’ mean?**

‘Primarily iron or steel’ places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

**13) Can you provide an example of how to perform a cost determination?**

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

**14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?**

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

**15) What is the definition of steel?**

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

**16) What does ‘produced in the United States’ mean?**

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the

material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components do not have to be of domestic origin.

**17) Are the raw materials used in the production of iron or steel required to come from US sources?**

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

**18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?**

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

**19) What is the definition of ‘municipal castings’?**

Municipal castings are 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;
- Ballast Screen;
- Benches (Iron or Steel);
- Bollards;
- Cast Bases;
- Cast Iron Hinged Hatches, Square and Rectangular;
- Cast Iron Riser Rings;
- Catch Basin Inlet;
- Cleanout/Monument Boxes;
- Construction Covers and Frames;
- Curb and Corner Guards;
- Curb Openings;
- Detectable Warning Plates;
- Downspout Shoes (Boot, Inlet);
- Drainage Grates, Frames and Curb Inlets;
- Inlets;
- Junction Boxes;
- Lampposts;
- Manhole Covers, Rings and Frames, Risers;

Meter Boxes;  
Service Boxes;  
Steel Hinged Hatches, Square and Rectangular;  
Steel Riser Rings;  
Trash receptacles;  
Tree Grates;  
Tree Guards;  
Trench Grates; and  
Valve Boxes, Covers and Risers.

## **20) What is ‘structural steel’?**

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

## **21) What is a ‘construction material’ for purposes of the AIS requirement?**

Construction materials are those 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, angles, 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, and stationary screens.

## **22) What is not considered a ‘construction material’ for purposes of the AIS requirement?**

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, supervisory control and



data acquisition (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, and dewatering equipment.

**23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?**

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

**24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?**

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

**Compliance**

**25) How should an assistance recipient document compliance with the AIS requirement?**

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under 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 can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance 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. Step certification is the best practice.

## **26) How should a State ensure assistance recipients are complying with the AIS requirement?**

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

## **27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?**

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a violation of a grant term and condition.

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-

888-546-8740 or [OIG\\_Hotline@epa.gov](mailto:OIG_Hotline@epa.gov). More information can be found at this website: <http://www.epa.gov/oig/hotline.htm>.

## **28) How do international trade agreements affect the implementation of the AIS requirements?**

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

### **Waiver Process**

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

### **Definitions**

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

## Step-By-Step Waiver Process

### Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to either of two email addresses. For CWSRF waiver requests, please send the application to: [cwsrfwaiver@epa.gov](mailto:cwsrfwaiver@epa.gov). For DWSRF waiver requests, please send the application to: [dwsrfwaiver@epa.gov](mailto:dwsrfwaiver@epa.gov).

## Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

1. Posting – After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA’s website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: [http://water.epa.gov/grants\\_funding/aisrequirement.cfm](http://water.epa.gov/grants_funding/aisrequirement.cfm)
2. Evaluation – After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.
3. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

## Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requiring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on policy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman, Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at [dorfman.jordan@epa.gov](mailto:dorfman.jordan@epa.gov) or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at [anderer.kirsten@epa.gov](mailto:anderer.kirsten@epa.gov) or (202) 564-3134.

Attachments

## Appendix 1: Information Checklist for Waiver Request

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

Items	✓	Notes
<p>General</p> <ul style="list-style-type: none"> <li>• Waiver request includes the following information:               <ul style="list-style-type: none"> <li>— Description of the foreign and domestic construction materials</li> <li>— Unit of measure</li> <li>— Quantity</li> <li>— Price</li> <li>— Time of delivery or availability</li> <li>— Location of the construction project</li> <li>— Name and address of the proposed supplier</li> <li>— A detailed justification for the use of foreign construction materials</li> </ul> </li> <li>• Waiver request was submitted according to the instructions in the memorandum</li> <li>• Assistance recipient made a good faith effort to solicit bids for domestic iron and steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime contractor</li> </ul>		
<p>Cost Waiver Requests</p> <ul style="list-style-type: none"> <li>• Waiver request includes the following information:               <ul style="list-style-type: none"> <li>— Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products</li> <li>— Relevant excerpts from the bid documents used by the contractors to complete the comparison</li> <li>— Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers</li> </ul> </li> </ul>		
<p>Availability Waiver Requests</p> <ul style="list-style-type: none"> <li>• Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested:               <ul style="list-style-type: none"> <li>— Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials</li> <li>— 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.</li> <li>— Project schedule</li> <li>— Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials</li> </ul> </li> <li>• Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought</li> <li>• Has the State received other waiver requests for the materials described in this waiver request, for comparable projects?</li> </ul>		

## Appendix 2: HQ Review Checklist for Waiver Request

Instructions: To be completed by EPA. Review all waiver requests using the questions in the checklist, and mark the appropriate box as Yes, No or N/A. Marks that fall inside the shaded boxes may be grounds for denying the waiver. If none of your review markings fall into a shaded box, the waiver is eligible for approval if it indicates that one or more of the following conditions applies to the domestic product for which the waiver is sought:

1. The iron and/or steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality.
2. The inclusion of iron and/or steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Review Items	Yes	No	N/A	Comments
<b>Cost Waiver Requests</b> <ul style="list-style-type: none"> <li>• Does the waiver request include the following information?               <ul style="list-style-type: none"> <li>— Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products</li> <li>— Relevant excerpts from the bid documents used by the contractors to complete the comparison</li> <li>— A sufficient number of bid documents or pricing information from domestic sources to constitute a reasonable survey of the market</li> </ul> </li> <li>• Does the Total Domestic Project exceed the Total Foreign Project Cost by more than 25%?</li> </ul>				
<b>Availability Waiver Requests</b> <ul style="list-style-type: none"> <li>• Does the waiver request include supporting documentation sufficient to show the availability, quantity, and/or quality of the iron and/or steel product for which the waiver is requested?               <ul style="list-style-type: none"> <li>— Supplier information or other documentation indicating availability/delivery date for materials</li> <li>— Project schedule</li> <li>— Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of materials</li> </ul> </li> <li>• Does supporting documentation provide sufficient evidence that the contractors made a reasonable effort to locate domestic suppliers of materials, such as a description of the process for identifying suppliers and a list of contacted suppliers?</li> <li>• Based on the materials delivery/availability date indicated in the supporting documentation, will the materials be unavailable when they are needed according to the project schedule? (By item, list schedule date and domestic delivery quote date or other relevant information)</li> <li>• Is EPA aware of any other evidence indicating the non-availability of the materials for which the waiver is requested? Examples include:               <ul style="list-style-type: none"> <li>— Multiple waiver requests for the materials described in this waiver request, for comparable projects in the same State</li> <li>— Multiple waiver requests for the materials described in this waiver request, for comparable projects in other States</li> <li>— Correspondence with construction trade associations indicating the non-availability of the materials</li> </ul> </li> <li>• Are the available domestic materials indicated in the bid documents of inadequate quality compared those required by the project plans, specifications, and/or permits?</li> </ul>				



### **Appendix 3: Example Loan Agreement Language**

ALL ASSISTANCE AGREEMENT MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN SRF ASSISTANCE AGREEMENTS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE LAW:

Comply with all federal requirements applicable to the Loan (including those imposed by the 2014 Appropriations Act and related SRF Policy Guidelines) which the Participant understands includes, among other, requirements that all of the iron and steel products used in the Project are to be produced in the United States (“American Iron and Steel Requirement”) unless (i) the Participant has requested and obtained a waiver from the Agency pertaining to the Project or (ii) the Finance Authority has otherwise advised the Participant in writing that the American Iron and Steel Requirement is not applicable to the Project.

Comply with all record keeping and reporting requirements under the Clean Water Act/Safe Drinking Water Act, including any reports required by a Federal agency or the Finance Authority such as performance indicators of program deliverables, information on costs and project progress. The Participant understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities and (ii) failure to comply with the Clean Water Act/Safe Drinking Water Act and this Agreement may be a default hereunder that results in a repayment of the Loan in advance of the maturity of the Bonds and/or other remedial actions.

#### **Appendix 4: Sample Construction Contract Language**

ALL CONTRACTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE AIS REQUIREMENT. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN ALL CONTRACTS IN PROJECTS THAT USE SRF FUNDS. EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THIS CLAUSE WITH RESPECT TO STATE OR LOCAL LAW:

The Contractor acknowledges to and for the benefit of the City of \_\_\_\_\_ (“Purchaser”) and the \_\_\_\_\_ (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as “American Iron and Steel;” that requires all of the iron and steel products used in the project to 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 to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products 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 Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State 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 State.

## Appendix 5: Sample 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

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 (XXXXXXXXXXXX)

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



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF WATER

**MEMORANDUM**

**SUBJECT:** Prohibition on Certain Telecommunication and Video Surveillance Services or Equipment in the SRF Programs

**FROM:** Kiri Anderer, P.E., Acting Associate Branch Chief  
Infrastructure Branch, OGWDW

Michael Deane, Branch Chief  
State Revolving Fund Branch, OWM

**TO:** SRF Branch Chiefs  
Regions 1-10

Effective August 13, 2020, recipients and subrecipients of EPA funded assistance agreements, including borrowers under EPA funded revolving loan funds, must comply with regulations at [2 CFR 200.216](#), *Prohibition on certain telecommunication and video surveillance services or equipment*, implementing section 889 of [Public Law 115-232](#). The regulation prohibits the use of Federal funds to procure (enter into, extend, or renew contracts) or obtain equipment, systems, or services that use “covered telecommunications equipment or services” identified in the regulation as a substantial or essential component of any system, or as critical technology as part of any system. Prohibitions extend to the use of Federal funds by recipients and subrecipients to enter into a contract with an entity that “uses any equipment, system, or service that uses covered telecommunications equipment or services” as a substantial or essential component of any system, or as critical technology as part of any system. Certain equipment, systems, or services, including equipment, systems, or services produced or provided by entities subject to the prohibition are recorded in the [System for Award Management](#) exclusion list.

As described in section 889 of Public Law 115-232, covered telecommunications equipment or services includes:

- Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- Telecommunications or video surveillance services provided by such entities or using such equipment.

- Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

### **Applicability in the State Revolving Fund (SRF) Programs**

Clean Water and Drinking Water SRF (CWSRF and DWSRF) programs may not expend equivalency funds for these products on or after August 13, 2020. States must ensure that equivalency assistance agreements include the telecommunications prohibition condition [provided by EPA's Office of Grants and Debarment](#) (OGD) in OGD's most recent EPA General Terms and Conditions. The condition must also be in construction contracts associated with equivalency assistance agreements.

There is no exhaustive list of components and services that fall under the prohibition. State SRF managers and local assistance recipients should exercise due diligence and be particularly mindful of project components with internet or cellular connections. For example, recipients should be mindful of automatic meter reading (AMR) technology and advanced metering infrastructure (AMI), instrumentation control systems (e.g. process control systems, distributed control systems and programmable logic controls), and security cameras and other electronic security measures to ensure that those items are procured from a non-excluded entity. Items included in the prohibition are not eligible SRF costs, and the SRF programs cannot reimburse borrowers for these costs.

The prohibition also applies to the CWSRF administrative funds (if states are billing those costs to the federal CWSRF capitalization grant) and the four DWSRF set-asides. States should be mindful of items such as cell phones, computers, and mobile WiFi routers or hotspots funded by those accounts.

If you have questions on the implementation of this grant condition, please contact Michael Deane at [Deane.Michael@epa.gov](mailto:Deane.Michael@epa.gov) or Kiri Anderer at [Anderer.Kirsten@epa.gov](mailto:Anderer.Kirsten@epa.gov).

## DIVISION 1 – GENERAL REQUIREMENTS

01010	Summary of Work
01024	Measurement and Payment
01040	Project Coordination
01045	Cutting, Coring, and Patching
01050	Field Engineering
01110	Environmental Protection Measures
01200	Project Meetings
01300	Submittals
01311	Construction Progress Schedules
01370	Schedule of Values
01380	Construction Photographs
01400	Quality Assurance
01500	Temporary Facilities and Controls
01600	Control of Materials
01610	Delivery, Storage, and Handling
01650	Facility Start-up/Commissioning
01700	Contract Closeout
01710	Cleaning Up
01730	Operation and Maintenance Data
01740	Warranties and Bonds

## SECTION 01010

### SUMMARY OF WORK

#### PART 1 – GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

##### 1.2 LOCATION OF WORK

- A. The work to be performed under this Contract shall be conducted at the sites of the Army Camp Well House and Indian Springs Well House located on Prudence Island in Narragansett Bay, Rhode Island. The island is only accessible by boat.
- B. In general and without limitation, the work to be done under this contract includes the construction of a drinking water treatment plant including but not limited to furnishing and installing; precast concrete building and foundation; site preparation, grading, and restoration; yard piping, fittings, valves, hydrant, and appurtenances; infiltration basin; a packaged greensand pressure filtration system; backwash supply tank and pump; process piping and valves; pumps; chemical feed systems; instrumentation and controls; facility HVAC and electrical; start-up and performance testing.
- C. The work to be performed shall include the work shown on the Drawings, as specified herein, and as indicated below.
- D. All construction activities must be completed while meeting the requirements of Section 00820 (SRF Requirements).
- E. The Work includes, but is not necessarily limited to the following major items:
  - 1. Coordination of all construction activities with the appropriate local and State Authorities and utility companies.
  - 2. Coordinating all transportation of required construction materials, equipment, and labor on and off the island.
  - 3. Attending a pre-construction conference and the required job progress meetings.
  - 4. Submission of a construction schedule, list of subcontractors, and proposed source locations for off-site materials, including, but not limited to: crushed stone, coarse sand, dense graded crushed stone, gravel borrow, concrete, and asphalt pavement.



5. Obtaining necessary permits and licenses, maintaining all items required by applicable permits, and payment of fees.
6. Submission of all required shop drawings, in a timely manner, to the Engineer, for review.
7. Perform all field engineering associated with the project work including, but not limited to, construction layout and elevations and preparation of an as-built CADD plan at the completion of the project.
8. Mobilization to the Site and Demobilization from the Site. The Project site is only accessible by boat.
9. Providing Site Security and other construction site control measures, as needed.
10. Protection of existing on-site structures and coordination with on-going Owner operations.
11. On-site and laboratory testing, as specified.
12. Clearing and grubbing areas around the proposed WTP.
13. Civil/site construction including: site preparation, dewatering, grading, excavation, earthwork, signage, yard piping, infiltration basin; flushing hydrant, valves, disinfection, cement concrete pads, restoration of pervious areas, tree protection and trimming, and temporary excavation support systems.
14. Architectural and structural construction including: new 24' x 24' precast concrete single-story water treatment facility.
15. Process mechanical construction including: a greensand filtration skid with 2 pressure vessels (media included), 2 sodium hypochlorite chemical storage, feed systems, backwash supply tank and pump, chlorine analyzers, valves, and various associated process piping, and appurtenances. The work includes disinfection of water systems, start-up, check-out, field testing, and O&M training of the mechanical process equipment.
16. HVAC construction for the new treatment facility and its associated facilities, including thermostats, fan coils and unit heaters, HVAC instrumentation and controls, and HVAC systems testing, adjusting, and balancing.
17. Plumbing construction for the treatment facility and its associated facilities, including portable emergency eyewash, chlorine analyzers, drains, and rinsewater pump.
18. Electrical construction including lighting, outlets, low voltage panel boards,

wiring, conduit, and testing.

19. Instrumentation and controls construction including: instrumentation and controls hardware and products such as flow instruments, pressure instruments, level instruments, and analytical instruments, calibration of devices, programming.
  20. Furnishing all materials, labor and equipment for surface preparation, heating, and dehumidification for the application of the interior coating systems on process piping.
  21. Furnishing, installation, relocation, and removal of all piping, fittings, valves, hydrant, thrust blocks, restrained joints, couplings, appurtenances, and water main as shown on the plans and as directed by the Engineer required for the installation of the new yard piping.
  22. Furnishing and installing all electrical and instrumentation conduits as shown on the Drawings.
  23. Performing all excavations and backfilling areas to be excavated including furnishing all backfill materials and surface restoration.
  24. Furnishing, installation and maintenance of all traffic control and safety measures during the construction period, including signs, barricades, detours, maintenance of safe vehicular and pedestrian access to abutting properties, and assuring an uninterrupted supply of utility services to all abutters within the project area at all times, unless otherwise approved by the Owner and Engineer.
  25. Water quality sample collection and analysis at a Rhode Island State Certified laboratory for Heterotrophic Plate Count and Coliform Bacteria.
  26. One year anniversary inspection of all work will be completed (1) year following the issuance of the Certificate of Substantial Completion. The inspection will be detailed by the Owner.
- F. The work shall also conform to such additional Drawings and addenda to these Specifications and Drawings as may be published or exhibited prior to the opening of bid proposals and to such Drawings in explanation of details, or as may be furnished by the Engineer from time to time during the construction.
- G. Work and materials which are necessary in the construction, but which are not specifically referred to in the Specifications or shown on the Drawings, but implied by the contract, shall be furnished by the Contractor at his own cost and expense, and shall be such as will correspond with the general character of the work, as may be determined by the Engineer, whose decisions as to the necessity for and character of such work and materials shall be final and conclusive. It is the intent of these Specifications to produce a complete, finished job, whether shown in every detail or not.

### 1.3 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall limit the use of the premises for his/her Work and for storage to allow for:
  - 1. Property Owner occupancy.
- B. Coordinate use of premises with Engineer and Owner.
- C. Contractor shall assume full responsibility for security of all his/her and his/her subcontractors materials and equipment stored on the site.
- D. If directed by the Owner or Engineer, move any stored items which interfere with operations of Owner or other contractors.
- E. The Contractor's use of Owner's water for construction purposes and operation of hydrants shall be authorized and coordinated with the Owner.
- F. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

### 1.4 PROPERTY OWNER OCCUPANCY

- A. Contractor shall not limit the use or access of the premises by the Owner and reasonable notification will be made by each party to inform the other if the site will be unavailable for any period of time.

### 1.5 UTILITIES

- A. The utilities shown on the plans have been located primarily from information furnished by others and are considered approximate both as to size and location. It shall be the Contractor's responsibility to locate all existing utilities and to protect same from damage or harm. All utilities interfered with or damaged shall be properly restored, at the expense of the Contractor, to the satisfaction of the Owner and Engineer.

### 1.6 WORK SEQUENCE

- A. Operation of the existing water supply sites must be maintained throughout the duration of the project. The Contractor shall complete all work (including installation, start-up, and acceptance testing) without interfering with the operation of the existing wells unless approved by the Owner.
- B. The Contractor shall submit a sequence of work for the Engineer's review and approval for any proposed shut-downs. Proposed shut-downs shall be limited to a maximum of 8 continuous hours. A minimum 24-hour period is required between shut-downs. After

approval of the proposed shut-down plan, a minimum seven (7) day period shall be provided by the Contractor prior to any shut-down of the existing wells.

- C. The Contractor shall submit a sequence of work for the overall project for the Engineer's review and approval.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01024

### MEASUREMENT AND PAYMENT

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Under the price specified to be paid for each item, the Contractor shall furnish all materials and equipment, furnish all labor and plant, and do all operations necessary to complete all work specified or shown. All supervision, overhead items, protection, and precautions, permit fees, bonds, insurance fees, and all other costs incidental to the construction work including training, start-up, testing, and calibration services, complete, and as specified, are included.
- B. A complete, finished, working job, as intended by the general nature of these Specifications, shall be produced whether or not any particular wording or direction is omitted or inadvertently not clearly stated.
- C. Measurement for payment shall be by the Engineer, except where noted elsewhere in this Specification. Measurement for payment for lump sum items shall be on the basis of percentage of work complete and in place.
- D. Each unit or lump sum price stated in the bid shall constitute full compensation as herein specified for each item of work completed in accordance with the Drawings and Specifications.

##### 1.2 ITEM DESCRIPTIONS

- A. Item 1: Indian Springs Water Treatment Plant and Chlorination Systems
  - 1. The lump sum for this item shall constitute full compensation for furnishing all labor, materials, tools, devices, and equipment necessary for constructing a water treatment plant, chlorination systems, and appurtenant work, which is not included in Bid Item 2, complete as indicated on the Drawings and as specified. Under the lump sum price bid for this item, the Contractor shall do all the remaining work shown on the contract drawings and specified in the specifications, not included in Bid Item 2, to construct and install a fully functioning water treatment plant and chlorine feed facilities. Work generally includes, but is not limited to: all labor, equipment, materials, and services; mobilization; demobilization; temporary facilities; storage areas; snow removal as required for Work completion and dealing with adverse weather conditions; obtaining electrical power for dewatering or other construction operations; maintaining all items required by applicable permits; obtaining necessary permits and licenses; payment of fees; sampling and testing materials; providing required insurance; cleaning up; providing shop and working drawings, certificates and schedules; loam, seed, and fertilize all disturbed areas not scheduled to be paved or receive gravel as a result of construction activities; sampling; laboratory

analyses; any costs incurred by the Contractor for usage of the public water supply; excavation, backfill, and dewatering; clearing, grubbing, and site preparation; site grading; earthwork; stormwater management; cement; concrete pads; yard piping, hydrant, valves, and appurtenances; trench boxes and trench shields; landscaping; and appurtenances; furnishing and placing of all concrete and steel; architectural and building construction; below-grade concrete foundation; painting interior process piping; furnishing, anchoring, and installing mechanical process piping, valves and equipment including, greensand pressure filtration system with media, backwash supply tank and pump, 20 gallons 12.5% sodium hypochlorite, chemical storage, handling, and chemical feed systems, butterfly valves, start-up, check-out, field testing, and O&M training of the mechanical process equipment; programming; pressure and leakage testing; disinfection; dechlorination; project signage, and all other work necessary for a complete installation in accordance with the Drawings and Specifications.

2. Measurement for payment will be based on the percentage of work completed, as determined by the Engineer.

B. Item 2: All Other Work Not Included in Item 1

1. The lump sum for this item shall constitute full compensation for furnishing all labor, materials, tools, devices, and equipment and installation thereof necessary for the Contractor to complete the work shown on the contract drawings and specified in the specifications, not included in Bid Item 1, to construct and install a fully functioning water treatment plant and chlorination facilities.
2. Measurement for payment will be based on the percentage of work completed, as determined by the Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

## SECTION 01040

### PROJECT COORDINATION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
  - 1. Coordination.
  - 2. Administrative and supervisory personnel.
  - 3. General installation provisions.
  - 4. Cleaning and protection.
- B. Progress meetings and preconstruction conferences are included in Section 01200 – “Project Meetings”.
- C. Requirements for the Contractor's Construction Schedule are included in Section 01300 – “Submittals”.

#### PART 2 - PRODUCTS (NOT USED)

#### PART 3 - EXECUTION

##### 3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Inspect the conditions under which Work is to be performed as detailed in these specifications.
- B. Manufacturer's Written Instructions: Comply with manufacturer's written installation instructions as required for all materials, equipment and coating used on this project.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items, and at no additional cost to the Owner.
- D.. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

### 3.2 CLEANING AND PROTECTION

- A. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
1. Excessive static or dynamic loading.
  2. Excessive internal or external pressures.
  3. Excessively high or low temperatures.
  4. Air contamination or pollution.
  5. Water or ice.
  6. Solvents.
  7. Chemicals.
  8. Heavy traffic.
  9. Misalignment.
  10. Unprotected storage.
  11. Improper shipping or handling.
  12. Theft.
  13. Vandalism.

END OF SECTION



## SECTION 01045

### CUTTING, CORING, AND PATCHING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for any cutting, coring, rough and finish, and patching as necessary.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.
- C. Demolition of selected portions of buildings or structures for alterations is specified in Section 02070 - Selective Demolition.
- D. Painting of materials impacted by cutting and patching activities is included in Division 9 of these specifications.

##### 1.3 SUBMITTALS

- A. Cutting, Coring, and Patching Proposal: Proposed procedures for cutting and patching must be submitted well in advance of the time cutting and patching will be performed. Include the following information as applicable, in the proposal:
  - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
  - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components, as well as changes in the building's appearance and other significant visual elements.
  - 3. List products to be used and firms or entities that will perform work.
  - 4. Indicate dates when cutting and patching is to be performed.
  - 5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.

6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Review by the Engineer prior to proceeding with cutting and patching does not waive the Engineer's right to later require complete removal and replacement of a part of the work found to be unsatisfactory.
8. Refer to Paragraph 1.4 - Quality Assurance and submit the information specified.

#### 1.4 QUALITY ASSURANCE

- A. No structural members shall be cut without the approval of the Engineer. No holes shall be drilled in beams or other structural members without the approval of the Engineer.
  1. Submit for review the cutting and patching proposal before cutting and patching the following structural elements:
    - a. Foundation construction
    - b. Bearing and retaining walls
    - c. Structural concrete
    - d. Structural steel
    - e. Lintels
    - f. Structural decking
    - g. Miscellaneous structural metals
    - h. Equipment supports
    - i. Piping, ductwork, vessels, and equipment
- B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
- C. Operational and Safety Limitations: Do not cut and patch operating elements or safety-related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance or decreased operational life or safety.
  1. Submit for review the cutting and patching proposal before cutting and patching the following operating elements or safety-related systems:
    - a. Shoring, bracing, and sheeting
    - b. Primary operational systems and equipment
    - c. Water, moisture, or vapor barriers
    - d. Membranes and flashings
    - e. Control systems
    - f. Communication systems
    - g. Electrical wiring systems

- D. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.
  - 1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:
    - a. Unit masonry.
    - b. Stucco and plaster.
    - c. Aggregate wall coating.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available, or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched, and conditions under which cutting and patching is to be performed. Take corrective action before proceeding if unsafe or unsatisfactory conditions are encountered.
  - 1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

- D. Take all precautions necessary to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed or relocated, until provisions have been made to bypass them.
- E. Check area during sawing operations for partial cracking and provide additional support and bracing to prevent a partial release of cut area during sawing operations.
- F. Provide equipment of adequate size to remove cut panels.

### 3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
  - 1. Cut existing construction to provide for installation of other components or performance of other construction activities, and the subsequent fitting and patching required to restore surfaces to their original condition.
    - 2. All cutting and coring shall be performed in such a manner as to limit the extent of patching.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
  - 1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or diamond core drill.
  - 4. Bypass utility services, such as pipe or conduit, before cutting where services are shown or required to be removed, relocated, or abandoned. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after bypassing and cutting.
  - 5. Provide full control of slurry generated by sawing operations on both sides of wall.
  - 6. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage bond between the concrete and reinforcing steel left in the structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

C. Coring:

1. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved.
2. If holes are cored through floor slabs they shall be drilled from below.
3. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.
4. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeve, equipment or mechanical seals to be installed.
5. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.
6. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.
7. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

D. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
4. Where patching occurs in a painted surface, extend final paint coat over unbroken area containing the patch after the patched area has received primer and second coat.
5. Finish patching shall be the responsibility of the Contractor and shall be performed by the trade associated with the application of the particular finish.

### 3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit, and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01050  
FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
1. Examination of site and conditions of construction.
  2. Establishment of lines, grades, and easements.
  3. Connections to existing facilities.
  4. Restoration and protection of public and private property.

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - Submittal Procedures:
1. A post construction topographic survey shall be provided by the Contractor and shall be stamped by a Registered Land Surveyor (RLS).
    - a. Topographic Survey: After completion of construction activities, a topographic survey shall be conducted by an RLS and a record drawing shall be prepared signed and sealed by the RLS, which includes the following information:
      - 1) Locating the construction control points, including establishing and maintaining permanent bench marks.
      - 2) Location of all property lines within 200 feet of the work area.
      - 3) The topographic survey work shall extend to the limit of work shown on the Drawings. Provide topographic survey with 1-ft contours and spot elevations.
      - 4) Location of all permanent utilities, and drainage structures within the work area.

- 5) The invert elevations of all drainage structures and gravity pipe inlets and outlets.
  - 6) The information obtained from this survey shall be professionally drafted on 22" x 34" sheets, using a scale of 1"=40' and shall be based on NGVD88 datum, and using the Massachusetts Coordinate System Horizontal Datum.
- b. The Contractor shall submit the record drawing in both pdf form as specified above, and as an AutoCAD drawing file (version 2020 compatible, or more recent).

#### 1.4 PROJECT/SITE CONDITIONS

##### A. Environmental Requirements:

###### 1. Unfavorable Construction Conditions:

- a. During unfavorable weather, wet grounds, or other unsuitable construction conditions, confine operations to work which will not be affected adversely by such conditions.
- b. No portion of Work shall be constructed under conditions which adversely affect quality or efficiency thereof, unless special means or precautions are taken to perform Work in manner acceptable to the Engineer.

##### B. Field Measurements:

###### 1. Lines and Grades:

- a. All Work shall be done to lines, grades, and elevations indicated on drawings or specified herein.
- b. Elevations on the construction plans are in NGVD88 vertical datum and any plans required by this section are to be done in the same datum. Contractor shall be responsible for maintaining or subsequently replacing these controls to the satisfaction of the Engineer if these controls are disturbed. The Contractor shall be responsible for verifying all vertical control information that is used.
  - 1) Points shall be used as datum for work.
  - 2) Contractor shall be responsible for transferring all lines and grades from basic survey control points.
- c. Contractor to perform all additional survey, layout, and measurement work.



- 1) The Contractor shall provide survey work by a firm having successfully completed at least two projects of similar size and complexity within the last five years, and who shall employ experienced personnel and provide adequate supervision to satisfaction of the Engineer at all times when operations are in progress.
  - 2) Surveyor shall be a registered land surveyor (RLS) in the State of Massachusetts.
    - d. Keep the Engineer informed, in writing, two weeks in advance, of times and places at which work is to be performed, so that horizontal and vertical control points may be established and any checking deemed necessary by the Engineer may be performed.
    - e. Remove and reconstruct Work which is improperly located as determined by the Engineer and at no additional cost to the Owner.
2. Easements and Rights-of-Way:
- a. Easements and rights-of-way for utilities, if required, will be provided by the Owner.
  - b. Confine construction operations within limits indicated on drawings and/or within limits of easements or public ways.
  - c. Place construction tools, equipment, excavated materials, and pipeline materials and supplies, so as to cause least possible damage to property and interference with traffic.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Use new materials in restoration of existing facilities except where soil materials and plants may be reused as appropriate, and as approved by the Engineer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examination of Site and Verification of Conditions:
  1. Before starting operations, examine site to become acquainted with conditions to be encountered.
  2. Verify exact locations of sewers, water mains, gas mains, above or below ground electrical wires, other utilities, conduits and structures which may

interfere with work.

3. Verify and stake-out exact locations of the proposed work.

### 3.2 APPLICATION

- A. Site Layout: Prior to any construction activities at the site, the Contractor shall establish control points shown on the project drawings and coordinate this work with the Engineer. The Contractor shall use the information on the Drawings, where available, and shall supplement this with any necessary file searches to provide the necessary information to perform a complete line survey around the entire limits of the work area. The Contractor shall also establish permanent vertical benchmarks within the limit of work, as noted on the Drawings.
- B. Connections to Existing Facilities:
  1. Make connections to existing facilities as indicated on drawings or as specified.
  2. Obtain permission from specific utility owners in writing prior to undertaking connections.
    - a. Protect facilities against deleterious substances and damage.
  3. Plan in advance all connections to existing facilities which are in service.
    - a. All equipment, materials, and labor shall be on hand at time of undertaking connections to existing facilities in service.
    - b. Work shall proceed continuously if necessary to complete connections within the time designated by the Engineer.
    - c. Existing water distribution systems to be connected to shall not be taken out of service during periods of high demand; coordinate any disruptions to service with the Owner.
- C. Restoration and Protection of Public and Private Property:
  1. Protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by construction operations.
  2. Restore all public and private property including pavement, surfacing, curbs, walks, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all loam and seed and landscaping to their original condition or better, whether within or outside easements.

3.3 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 - Contract Closeout.

END OF SECTION

## SECTION 01110

### ENVIRONMENTAL PROTECTION PROCEDURES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. The work covered by this section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environmental for aesthetic and/or recreational purposes.
- B. The Contractor shall prepare and submit a site-specific Stormwater Pollution Prevention Plan (SWPPP). Work may not proceed at the project site until the Owner and/or Engineer have reviewed and approved the Contractor's SWPPP. Any delays incurred by the Contractor relating to reviews of the SWPPP shall be the responsibility of the Contractor and constitute no additional costs or claims to the Owner.

The Contractor's Stormwater Pollution Prevention Plan should outline the means/methods for ensuring the environmental protection procedures outlined herein are complied with. This shall include designating and outlining responsibilities for inspections/monitoring of Environmental Protections.

- C. The control of environmental pollution requires consideration of air, water, and land, and involves management of noise and solid waste, as well as other pollutants.
- D. Schedule and conduct all work in a manner that will minimize the generation of windblown dust and erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching, or other special surface treatments as are required to prevent silting and muddying of the drainage systems, wetlands, streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.
- E. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.
- F. Schedule and conduct all work in a manner that will minimize the level of noise escaping the site, especially at night and on weekends.

- G. A portion of the proposed work is located inside the 100 foot wetland buffer zone, therefore, an Order of Conditions is required and is included in Appendix H. However, Contractor is responsible for preparing and submitting all applicable regulatory construction permits required to perform the work.
- H. Contractor shall notify Millbury Conservation Commission in writing at least five days prior to the start of construction in accordance with the Order of Conditions. Refer to Appendix H for instructions.
- I. Contractor shall be responsible for maintenance of the erosion control structures and devices, and replacing as needed to maintain the required protection and performance.
- J. Upon completion of the installation of erosion control structures and devices, the Contractor shall request inspection of the controls by the Town of Millbury Conservation Agent. Work may not proceed at the project site until the Conservation Agent has approved of the erosion controls installation.

## 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.
- B. Related sections include the following:
  - 1. Section 02020 – Erosion and Sediment Control

## 1.3 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement.

## 1.4 NOTIFICATIONS

- A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. 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 unless it is later determined that the Contractor was in compliance.

## 1.5 IMPLEMENTATION

- A. Prior to commencement of the work, meet with the Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.
- B. Remove temporary environmental control features, when approved by the Engineer, and incorporate permanent control features into the project at the earliest practicable time.

## PART 2 – PRODUCTS

### 2.1 EROSION CONTROLS

- A. Woven Polypropylene wire-backed silt fencing and haybales as shown on the Drawings to be used for run-off control to protect the adjacent wetlands and surface water.

## PART 3 - EXECUTION

### 3.1 EROSION CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures such as siltation basins, haybale check dams, mulching, jute netting, and other equivalent techniques shall be used as appropriate. Offsite surface water shall be diverted around the site to a downstream channel ahead of siltation barriers. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

### 3.2 PROTECTION OF STREAMS, WETLANDS, AND SURFACE WATER

- A. Care shall be taken to prevent or reduce to a minimum any damage to any wetland, stream, drainage ditch, surface water body, storm drain or sewer from pollution by debris, sediment, or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the receiving body shall not be directly returned to the surface water body. Such water will be diverted through a settling basin or filter before being directed into the surface water body.
- B. The Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetland, surface water, storm sewer, or within

50-feet of any resource area. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.

- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action drawing or plan approved by the Massachusetts Department of Environmental Protection. Contractor shall submit two copies (2) of approved contingency drawings or plans to the Engineer.
- D. Equipment refueling operations must be performed at least 50 feet from any surface water body and groundwater supply well. Refueling operations must be witnessed by the Engineer.
- E. Water being flushed from structures or pipelines after disinfection, with a Cl<sub>2</sub> residue of 2 mg/l or greater, shall be treated with a dechlorination solution, in a method approved by the Engineer, prior to discharge.

### 3.3 PROTECTION OF LAND RESOURCES

- A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.
- B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.
- C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.
- D. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-in. in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer shall be immediately removed and replaced.

- E. The locations of the Contractor's storage, staging and other construction building, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings and shall require written approval of the Engineer and shall not be within wetlands or floodplains. No materials shall be stored within 25 feet of the wetland boundary. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of the work. Drawings showing storage facilities and staging shall be submitted for approval by the Engineer.
- F. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling, and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in Section 02920 and 02945, or as approved by the Engineer.
- G. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

### 3.4 PROTECTION OF AIR QUALITY

- A. Burning. The use of burning at the project site for the disposal of refuse and debris will not be permitted.
- B. Dust Control. The Contractor will be required to maintain all excavations, embankments, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or outside the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.
- C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust.
- D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer. This is especially important during the period when areas are being grubbed.

### 3.5 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION



- A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

### 3.6 NOISE CONTROL

- A. The Contractor shall make every effort to minimize noises caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal (OSHA) regulations. The operation of equipment shall not be allowed on Saturdays, Sundays, legal holidays, or between the hours of 4:00 p.m. and 7:00 a.m. without first obtaining approval from the Engineer.

END OF SECTION

SECTION 01200  
PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 COORDINATION WITH THE OWNER

- A. As part of this Contract, the Contractor shall coordinate his activities with the Owner. In addition, the Contractor will give the Owner significant notice on any work that may be required to meet the contract schedule.

1.3 PRECONSTRUCTION CONFERENCE

- A. A pre-construction conference will be held between the Contractor, the Engineer, and the Owner, to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.
- B. Contractor will be notified of the time, date and place where the pre-construction conference will be held.

1.4 PROGRESS MEETINGS WITH ENGINEER

- A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), hold general progress meetings twice each month with times coordinated with all the parties.
- B. Immediately following each progress meeting where revisions to the Progress Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 2 days after meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01300

### SUBMITTALS

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION OF REQUIREMENTS

- A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data, Samples, Construction Photographs, and Construction Schedules. Additional general submission requirements are contained in Article 7 of the General Conditions. Detailed submittal requirements will be specified in the technical specifications sections.
- B. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

##### 1.2 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

###### A. Shop Drawings

- 1. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.
- 2. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
- 3. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.
- 4. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.
- 5. Submittals for equipment specified under Division 2 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least one year.

B. Product Data

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliance's and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

C. Samples

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
  1. Field measurements
  2. Field construction criteria
  3. Catalog numbers and similar data
  4. Conformance with the Specifications
- B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Resident Project Representative a copy of each submittal transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer.

- C. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.
- D. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
- E. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

#### 1.4 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.
- B. Each submittal, appropriately coded, will be returned within 30 working days following receipt of submittal by the Engineer.
- C. Number of submittals required:
  - 1. Shop Drawings as defined in Paragraph 1.2 A: 3 copies.
  - 2. Product Data as defined in Paragraph 1.2 B: 3 copies.
  - 3. Samples: Submit the number stated in the respective Specification Sections.
- D. Submittals shall contain:
  - 1. The date of submission and the dates of any previous submissions.
  - 2. The Project title and number.
  - 3. Contractor identification.
  - 4. The names of:
    - a. Contractor
    - b. Supplier
    - c. Manufacturer
  - 5. Identification of the product, with the specification section number, page and paragraph(s).
  - 6. Field dimensions, clearly identified as such.
  - 7. Relation to adjacent or critical features of the Work or materials.
  - 8. Applicable standards, such as ASTM or Federal Specification numbers.
  - 9. Identification of deviations from Contract Documents.
  - 10. Identification of revisions on resubmittals.
  - 11. An 8-in x 3-in blank space for Contractor and Engineer stamps.

## 1.5 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

- A. The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:
1. as permitting any departure from the Contract requirements;
  2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
  3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes.

Code 1 - "NO EXCEPTION TAKEN" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 - "MAKE CORRECTIONS AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 - "SUBMIT SPECIFIED ITEM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 - "REVISE AND RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 - "REJECTED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.
- F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Not Approved" until resubmitted. The Engineer may at his/her option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.
- G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.
- H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

## 1.6 DISTRIBUTION

- A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed 6.

## 1.7 SCHEDULES

- A. Provide all schedules required by Articles 2 and 4, and elsewhere in the General Conditions.
- B. The Contractor shall submit a progress schedule before starting any work, in accordance with Article 2 of the General Conditions. The Contractor shall review the progress schedule with the Engineer periodically. Such review shall be made on a monthly basis or more frequently as required by the Engineer. The progress schedule shall be updated as required by the Engineer.

## 1.8 "OR EQUAL"

- A. Should the Contractor seek approval of a product other than the brand or brands named in these specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the Contractor shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature.
- B. Manufacturers' standard data and catalog cut sheets will not be considered sufficient in themselves, and the Engineer will not be responsible for seeking further data from the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product.
- C. The Contractor shall be responsible for all additional costs including license fees, foundation, piping and electrical work necessary to accommodate the proposed "or equal" equipment. Items which result in a cost reduction shall be presented and a change order reflecting 65% of the cost savings will be prepared and the contract price modified.

#### 1.9 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

- A. If specifically required in other Sections of these Specifications, the Contractor shall submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

#### 1.10 GENERAL PROCEDURES FOR SUBMITTALS

- A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION



P.E. CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the Commonwealth of Massachusetts and that he/she has been employed by (Name of Contractor) \_\_\_\_\_ to design \_\_\_\_\_ in accordance with Specification Section \_\_\_\_\_ for the replacement of the water main. The undersigned further certifies that he/she has performed the design of the \_\_\_\_\_, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the Owner or the Owner's representative with seven days following written request therefor by the Owner.

\_\_\_\_\_  
P.E. Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
Contractor's Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Address

## SECTION 01311

### CONSTRUCTION PROGRESS SCHEDULES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. Prepare and submit to Engineer for review projected construction schedules. Update and revise schedules periodically to reflect progress of work.

##### 1.3 FORM OF SCHEDULES

- A. Prepare in form of network analysis system using the Critical Path Method.
- B. Perform data preparation, analysis, charting and updating in accordance with pertinent recommendations contained in current edition of "CPM in Construction" manual of the Associated General Contractors.
- C. The network analysis system shall consist of a detailed network, mathematical analysis and a network diagram.
  - 1. The network diagram shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The basic concept of a network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.
  - 2. Detailed network activities shown on the network diagram shall include, in addition to construction activities, the submittal for approval of samples and shop drawings, the procurement of critical materials and equipment and their installation and testing.
  - 3. Related activities shall be grouped on the network. The activities on the critical paths shall be highlighted. The network shall be time scaled using units of approximately one-half inch equals one week or other suitable scale approved by the Engineer. Weekends and holidays shall be indicated. Where slack exists, the activities shall be shown at the earliest time they are scheduled to be accomplished. Sheet size shall be 30" x 60" minimum.

4. The mathematical analysis of the network diagram shall include a tabulation of each activity shown on the detailed network diagram. The following information shall be furnished as a minimum for each activity.
  - a. Preceding and following event numbers.
  - b. Activity description.
  - c. Estimated duration of activities in units of working days (being the best estimate available at time of computation).
  - d. Earliest start date (by calendar date).
  - e. Earliest finish date (by calendar date).
  - f. Scheduled or actual start date (by calendar date).
  - g. Scheduled or actual finish date (by calendar date).
  - h. Latest start date (by calendar date).
  - i. Latest finish date (by calendar date).
  - j. Slack or Float.
  - k. Monetary value of activity.
  - l. Responsibility for activity (Prime Contractor, subcontractors, suppliers).
  - m. Manpower required by trade and by total. Graphic representatives will be allowed.
  - n. Equipment required.
  
5. The mathematical analysis shall list the activities in sorts or groups as follows:
  - a. By the preceding event number from lowest to highest and then in the order of the following event number.
  - b. By the amount of slack, then in order of activity number.
  - c. By responsibility in order of earliest start date.

#### 1.4 REVIEW OF SYSTEM

- A. Participate in a review and evaluation of the proposed network diagrams and analysis by the Engineer. Revisions necessary as a result of this review shall be resubmitted to the Engineer within 10 days after the conference. Twenty days will be allowed for checking and further action by the Engineer. Progress payments will be withheld pending attainment of a mutually acceptable schedule. The mutually acceptable schedule shall then be the schedule to be used by the Contractor for planning, organizing, directing and executing the Work and for reporting progress. If the Contractor thereafter desires to make changes in his method of operating and scheduling he shall notify the Engineer in writing stating the reasons for the change. If the Engineer considers these changes to be of a major nature he may require the Contractor to revise and submit, without additional cost to the Owner, all of the affected portion of the network diagram and mathematical analysis to show the effect on the entire project. A change may be considered of a major nature if the time estimated to be required or actually used for an activity or the logic of sequence of activities is varied from the original plan to a degree that there is reasonable doubt as to the effect on the Contract completion date or dates. Changes which effect activities with adequate slack time shall be considered as minor changes, except that

an accumulation of minor changes may be considered as a major change when their cumulative effect might affect the Contract completion date.

## 1.5 UPDATES

- A. Submit at intervals of 30 days a report of the actual construction progress by updating the mathematical analysis. All contract changes, including pending and approved change orders and field orders shall be included in the update schedule. Revisions causing changes in the detailed network shall be noted on the network or a revised issue of the affected portions of the detailed network furnished. The network shall be revised as necessary for the sake of clarity.
- B. The report shall show the activities or portions of activities completed during the reporting period and their total value as basis for the Contractor's periodic request for payment. Coordinate with the schedule of breakdown of lump sum items. The report shall state the percentage of the Work actually completed and schedule as of the report date and the progress along the critical path in terms of days ahead or behind the allowable dates. If the project is behind schedule, progress along other paths with negative slack shall be reported. Percentage of work actually completed will be reviewed by the Engineer. If the Contractor fails to submit the required monthly reports and updates within the time prescribed, the Engineer may withhold approval of progress payment estimates until such time as the Contractor submits the required reports and updates. Three copies of the report shall be submitted for each update.
- C. Simultaneously submit a narrative report with the updated analysis which shall include but not be limited to a description of the problem areas, current and anticipated delaying factors, their impact, and an explanation of corrective actions taken or proposed.

## 1.6 SUBMITTALS

- A. Within 15 days after execution of the AGREEMENT, submit 3 copies of a preliminary schedule indicating planned operations during first 60 days. Include cost of activities expected to be completed before submission and approval of the complete schedule.
- B. Within 30 days after execution of the AGREEMENT, submit 3 copies of the complete network analysis system. After review, submit 3 copies of the mutually acceptable system.
- C. Submit 3 copies of monthly reports and updates by the tenth day of the month.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01370

### SCHEDULE OF VALUES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, Division 2, Division 3, Division 9, Division 11, and Division 13 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section includes the following:
  - 1. Provide schedule of values covering each lump sum bid item.

##### 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
  - 1. Schedule of values.
    - a. Revise and resubmit schedule until acceptable to the Engineer.
  - 2. Itemize separate line item cost for work involving each lump sum item.
    - a. Ensure that the sum of the items listed in the schedule of values for each lump sum item equals the price bid for the respective lump sum item.
    - b. For "Mobilization and Demobilization", items such as temporary construction facilities may be listed separately in the schedule, provided amounts can be substantiated.
  - 3. Breakdown installed costs into:
    - a. Delivered cost of product.
    - b. Total installed cost with overhead and profit.
      - 1) Do not list overhead and profit as separate items.
    - c. For water pipelines and water tanks, include a breakdown for testing, chlorinating and putting into service.

4. An unbalanced schedule of values providing for overpayment on items of work performed first will not be accepted.

#### 1.4 SEQUENCING AND SCHEDULING

- A. Prepare schedule of values covering each lump sum item after review of tentative schedule at preconstruction conference, but before submission of first application for payment.
- B. Before submitting any application for payment, obtain the Engineer's approval of the Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01380

### CONSTRUCTION PHOTOGRAPHS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. Provide digital construction and aerial photographs pertinent to the Contract work during the Contract period as specified and as directed by the Engineer.

##### 1.3 SUBMITTALS

- A. Proposed Photographer
  - 1. Several different samples of work by proposed photographer on construction and aerial photography of similar nature to the work under this Contract.
  - 2. Two copies of proposed photographer's experience and qualifications in similar work. Include copies of references and any certification acquired.
  - 3. Two copies of techniques, materials and equipment proposed to be used.
- B. Two copies of compact disks containing all digital construction photos submitted on a monthly basis.
- C. Two copies of color prints for each digital photograph submitted on a monthly basis, each identified and mounted as specified.

##### 1.4 QUALITY ASSURANCE:

- A. Photographer proposed to be approved by Engineer.
- B. Photographer's experience and qualifications:
  - 1. Not less than 2 accumulated years of experience with similar construction photography.
- C. Photographer to use techniques, material and equipment capable of producing photographs of high quality and resolution.
- D. Photographer to be available on call on one day notice when requested by Engineer and be prepared to respond on shorter notice in unusual or unexpected conditions.

- E. Dates for photography at site to be coordinated with Engineer and Engineer to be present during photographic periods at site unless approved otherwise by Engineer.
- F. Contractor to make and retain detailed records of all photographs by photographer under this Contract:
  - 1. The records to be in sufficient detail to support any attestation that may be required of photographer.
  - 2. Photographer to retain such records for a period not less than two years from the final acceptance of entire work under this Contract.

## PART 2 - PRODUCTS

### 2.1 DIGITAL NEGATIVES

- A. Remain the property of the photographer.
- B. Capable of producing sharp prints of high resolution.
- C. Photographer to retain digital negatives for a period of at least two years from the date of final acceptance of the entire work under the Contract.

### 2.2 PRINTS

- A. Type: Color prints of digital photographs.
- B. Finish: Smooth glossy surface.
- C. Size: 8-in. x 10-in. plus suitable margin for identification.
- D. Paper weight: Single weight.
- E. Number of prints: Two of each digital photograph.

### 2.3 PRINT IDENTIFICATION

- A. Each print to carry identification and information on it in a manner that results in minimum interference with exposure printed.
- B. Front of Print:
  - 1. Top margin:
    - a. Project name.
    - b. Brief title of view.



2. Bottom margin:
  - a. Photographer's numbered identification of exposure.
  - b. Time and date of exposure.
  - c. Name of photographer making exposure.

C. Back of Print:

1. Detailed description of view including point from which exposure made, compass direction of view, vertical declination of view (horizontal, looking up, looking down etc.) identification of main features in view and any other data and information pertinent to the purpose and identification of the exposure photographer feels necessary to include.
2. Weather conditions under which exposure made.

## 2.4 PRINT MOUNTING

- A. Each print to be inserted in a clear plastic envelope design for the purpose:
1. Print deterioration not to be caused by envelope material or fabrication.
  2. Designed to prevent print from accidentally slipping out of envelope.
  3. Front and back of print to be visible through the plastic envelope.
  4. Permit convenient removal and insertion of print.
  5. To have 1-in. hinged binding edge suitable for approved binder specified under subsection PRINT FILING BINDER.
- B. Mount each print on muslin with 1-in. hinged binding edge compatible with binder specified under subsection PRINT FILING BINDER.

## 2.5 PRINT FILING BINDER

- A. Furnish Engineer suitable approved binders for filing specified under subsection PRINT MOUNTING.
1. Initially furnish 2 binders and subsequently such additional binders as required by Engineer for filing the prints.
  2. All binders to be alike unless otherwise approved by Engineer.
- B. Binders:
1. Sturdy and durable for long term filing of prints.

2. Provisions for labeling front cover and binding face.
3. Have sturdy durable back and front cover hinges.
4. Of size suitable for filing mounted prints.
5. Permit convenient removal and insertion of mounted prints.

### PART 3 - EXECUTION

#### 3.1 GENERAL REQUIREMENTS

- A. Contractor shall notify Engineer at least 5 days in advance of any photographic sessions.
- B. Photographer to furnish additional prints beyond the number specified when requested by Engineer at commercial rates applicable at time of purchase.
- C. All views to contain a relative dimension reference that is easily recognizable by the average person. In views where dimensions are critical use a recognizable measuring devices such as folding ruler, measuring tape in a manner the markings are clear and sharp in the photograph and the device located in close relationship with subject of photograph.

#### 3.2 SITE PHOTOGRAPHY REQUIRED

- A. Provide photographs at following stages of construction:
  1. Site before commencement of any construction.
  2. Site upon completion of site clearing.
  3. At completion of each structural excavation.
  4. At completion of each structural foundation.
  5. At completion of framing or forming for structures.
  6. At completion of enclosures of structures.
  7. At 1-month intervals, progress photography during construction of facilities. Photos of any month need show only new work performed during month.
  8. Such special photographs required by Engineer.
  9. Upon completion of all Contract work over-all site photography.
- B. Views:

1. Coordinate with Engineer on views to be taken. In general views from locations to adequately illustrate state of project and condition of construction.
2. At least 3 different views of photographic subject except over-all site photography to have at least 4 different views unless otherwise approved by Engineer.
3. Succeeding photography of same photographic subject to be taken, insofar as practical, from the same view points as preceding photographic sessions. Variations in this procedure to be approved by Engineer.

### 3.3 AERIAL PHOTOGRAPHY REQUIRED

- A. Provide aerial photographs of the construction site during the following phases of the construction schedule:
  1. Prior to start of construction (Aerial Photograph #1)
  2. Between six and twelve months after start of construction (Aerial Photograph #2).
  3. Between twelve and twenty-four months after start of construction (Aerial Photograph #3).
  4. After substantial completion of construction (Aerial Photograph #4).
- B. The proposed schedule for aerial photograph #1 to be submitted by Contractor for Engineer's approval at pre-construction meeting.
- C. Final schedule of aerial photographs #2, #3, and #4 to be determined by Engineer and coordinated with Contractor.
- D. The aerial photographs shall capture the entire project limits of work.
- E. Each aerial photograph shall capture the project site in a north-south orientation from generally the same altitude and zoom as previous aerial photographs to sufficiently provide progressive continuity of work completed.

END OF SECTION

## SECTION 01400

### QUALITY ASSURANCE

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, Division 2, Division 3, Division 9, Division 11, and Division 13 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section covers Quality Assurance and Control requirements for this contract.
- B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors and suppliers and for assuring the quality specified in the Technical Specifications is achieved.
- C. Refer to the Article 7 - Contractor's Responsibilities, of the GENERAL CONDITIONS.

##### 1.3 TESTING LABORATORY SERVICES

- A. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to the Engineer. The laboratory must be certified by the State of Rhode Island for the parameters tested and required under the project. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.
- B. Preliminary Testing Services: Unless otherwise specified, the Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and the Contractor shall pay all costs for services.
- C. Quality Control Testing Services: Perform all quality control tests in the field or in the laboratory on concrete, asphalt mixtures, moisture-density (Proctor) and gradation tests on structural and embankment fills, and backfill materials, in-place field density tests on structural and embankment fills, and other materials and equipment, during and after their incorporation in the Work. Field sampling and testing shall be performed in the general manner indicated in the specifications, with minimum interference with construction operations. The Engineer shall determine the exact time and location of field sampling and testing, and may require such additional

sampling and testing as necessary to determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents.

- D. Arrangements for delivery of samples and test specimens to the testing laboratory will be made by the Contractor. The laboratory tests shall be performed within a reasonable time consistent with the specified standards. Furnish a written report of each test to the Engineer.
- E. Contractor shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field, the Contractor shall furnish personnel and facilities to assist in the activities.
- F. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.
- G. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.
- H. The testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory to the Contractor. Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor within three days after each test is completed.

#### 1.4 QUALITY ASSURANCE

- A. Codes and Standards: Refer to Article 3 - Contract Documents: Intent, Amending, Reuse of the General Conditions.
- B. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.
- C. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. Material and equipment shall not be used by the Contractor for any purpose other than that intended or specified unless such use is authorized by the Engineer.

- D. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

#### 1.5 OFFSITE INSPECTION

- A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by an independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer.
- B. The Contractor shall give appropriate written notice to the Engineer not less than 30 days before offsite inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.
- C. The inspection organization shall submit a written report to the Contractor who shall provide copies to the Engineer.

#### 1.6 MATERIALS AND EQUIPMENT

- A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.
- B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

#### 1.7 SHOP AND FIELD TESTING

- A. The Contractor is also responsible for providing the shop and field testing specified in the technical specification sections.
- B. The Contractor and its Subcontractor shall perform inspections, tests, and other services as required by the Contract Documents.
- C. Contractor shall provide twenty one days notice to the Engineer so that the Engineer may witness Contractor and/or Subcontractors off site and on site tests. The Engineer's witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

## 1.8 MANUFACTURER'S FIELD SERVICES

- A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturer's of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.
- B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each item of equipment for which field services are indicated in the specifications shall visit the site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

## 1.9 CERTIFICATION FORMS AND CERTIFICATES

- A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300 - Submittals.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 – EXECUTION

### 3.1 QUALITY CONTROL

- A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.
- B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies will be made available to the Engineer upon request.
- C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer or Owner to supersede or void that responsibility.

END OF SECTION

## SECTION 01500

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

##### 1.2 HOURS OF CONSTRUCTION

- A. Normal construction activity shall take place only between the hours of 7 a.m. to 4 p.m., excluding Saturdays, Sundays, and legal holidays. Work outside the above time periods will be permitted with the written approval of the Owner.
- B. Work in streets, roadways and areas adjacent to them shall cease at noon on days before legal holidays and at noon on Fridays prior to Monday holidays.

##### 1.3 DIMENSION OF EXISTING STRUCTURES

- A. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment that is dependent on the correctness of such information.

##### 1.4 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, fencing, caution signs, lights, and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench. Trenches and excavations shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.
- C. Contractor shall obtain proper trench permits as required.



## 1.5 INTERFERENCE WITH AND PROTECTION OF STREETS

- A. Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.
- B. Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore.
- C. The Contractor shall, at least 24 hours in advance, notify the Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.
- D. Construction parking shall be allowed only in areas approved by the Owner.

## 1.6 WATER FOR CONSTRUCTION PURPOSES

- A. The Contractor will be allowed to use water from the Owner for construction testing and start-up purposes. The contractor shall use an approved backflow device on the water connection.
- B. Water shall be metered as specified by the Owner. Hydrants shall only be operated under the supervision of the Owner's personnel.
- C. No direct cross connections will be permitted between the public water supply and the project site and water connection. All connections to points where there is the possibility of backflow shall be arranged to prevent backflow and shall be approved by the Owner.

## 1.7 TEMPORARY UTILITIES

- A. Temporary Light and Power: The Contractor shall at his own expense, provide his own temporary light and power as required for the prosecution and completion of work.
- B. Temporary Telephone: The Contractor shall have installed at his own expense a job telephone for his use and for the use of the Engineer. The Contractor shall pay all phone charges.
- C. Sanitary Provisions: The Contractor shall provide and maintain sanitary accommodations for the use of his employees and the Engineer, as may be necessary to comply with the requirements and regulations of the local and state departments of health.
- D. Maintaining Operation of the Existing Facilities:

1. The Contractor shall be responsible for careful consideration of the construction, scheduling and anticipation of potential interference with existing utilities, operations and structures. The Contractor shall maintain close communications with the Engineer and provide the Engineer with a detailed description of each proposed activity sufficiently in advance of its commencement for review and comments to be made.
2. Temporary facilities which may be required include, but are not limited to, electrical power; lighting; heating; cooling; ventilating; telephone; potable water; fire protection; drainage; sanitary facilities; trench covers; protection of existing utilities; structures; streams; trees and shrubs; access roads; sewage conveyance; and piping.

#### 1.8 ACCESS TO THE WORK

- A. The Contractor shall provide sufficient and proper facilities at all times for inspection of all work under this project in preparation or in progress, by the Owner, the agents and employees of the Owner, by authorized representatives of the State of Massachusetts and the Federal Government and by the Engineers.
- B. The Contractor shall furnish the Engineer or his authorized representative and other personnel mentioned above with such facilities and assistance as are necessary to ascertain performance of the work in accordance with the plans and specifications.

#### 1.9 PRECAUTIONS DURING ADVERSE WEATHER

- A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.
- B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means which will result in a moist or a dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

#### 1.10 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

- B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this section and elsewhere in the Specifications.
- C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

#### 1.11 DUST CONTROL

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of water as necessary, so as to minimize the creation and dispersion of dust.
- B. Products used to control dust shall be approved by the Owner.

#### PART 2 - PRODUCTS (NOT USED)

#### PART 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01600

### CONTROL OF MATERIALS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 APPROVAL OF MATERIALS

- A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.
- B. As specified in Section 01300, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.
- C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit additional samples or materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.
- D. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of a claim against the Owner or the Engineer.
- E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.
- F. The materials and equipment used on the work shall correspond to the approved samples or other data.

##### 1.3 BOLTS, ANCHOR BOLTS AND NUTS

- A. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

- B. All anchor bolts, nuts, washers, plates, and bolt sleeves shall be stainless steel unless otherwise indicated or specified.
- C. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and size.
- D. Bolts, anchor bolts, nuts, and washers specified to be stainless steel shall be Type 316 stainless steel. All anchor bolts, nuts, washers, plates and bolt sleeves to be submerged in a liquid shall also be Type 316 stainless steel.
- E. Anchor bolts and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 in. by 4 in. by 3/8 in. or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

#### 1.4 CONCRETE INSERTS

- A. Concrete inserts for hangers shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used in the inserts. Inserts for hangers shall be of a type which will permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut. All inserts shall be stainless steel.

#### 1.5 SLEEVES AND OPENINGS

- A. The Contractor shall provide all openings, channels, chases, and install anchor bolts and other items to be imbedded in concrete, as required to complete the work under this Contract, together with those required by subcontractors, and shall do all cutting and patching excepting cutting and patching of materials of a specific trade and as stated otherwise in the following paragraph.
- B. Subcontractors shall furnish all sleeves, inserts, hangers, anchor bolts, required for the execution of their work. It shall be their responsibility before the work of the Contractor is begun to furnish him with the above items and with templates, drawings or written information covering chases, openings, etc., which they require, and to follow up the work of the Contractor as it progresses, making sure that their drawings and written instructions are carried out. Failing to do this, they shall be responsible for the cost of any corrective measures which may be required to provide necessary openings, etc. If the Contractor fails to carry out the directions given him, covering details and locations of openings, he shall be responsible for any cutting and refinishing required to make the necessary corrections. In no case shall beams, lintels, or other structural members be cut without the approval of the Engineer.

- C. Unless otherwise indicated on the Drawings or specified, openings for the passage of pipes through floors and walls shall be formed of sleeves of standard-weight, galvanized-steel pipe. The sleeves shall be of ample diameter to pass the pipe and its insulation, if any, and to permit such expansion as may occur. Sleeves shall be of sufficient length to be flush at the walls and the bottom of slabs and to project 4 in. (min) above the finished floor surface. Threaded nipples shall not be used as sleeves.
- D. Sleeves in exterior walls below ground or in walls to have liquids on one or both sides shall have a 2-in. annular fin of 1/8-in. plate welded with a continuous weld completely around the sleeve at about mid-length to serve as a water stop and anchor collar. Sleeves shall be galvanized after the fins are attached.
- E. All sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

#### 1.6 GREASE, OIL AND FUEL

- A. All grease, oil and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied unless stated otherwise.

#### 1.7 REJECTED MATERIALS AND DEFECTIVE WORK

- A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer. The Contractor shall reimburse the Owner for any expenses, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

PART 2 - PRODUCTS (NOT USED)

PAGE 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01610

### DELIVERY, STORAGE AND HANDLING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

##### 1.3 TRANSPORTATION AND DELIVERY

- A. Transport and handle items in accordance with manufacturer's printed instructions.
- B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.
- C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.
- D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.
- E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- F. Provide equipment and personnel to unload all items delivered to the site.
- G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

##### 1.4 STORAGE AND PROTECTION

- A. Store and protect products in accordance with the manufacturer's printed instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him. Instructions shall be carefully

followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

- B. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION



## SECTION 01650

### FACILITY START-UP/COMMISSIONING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. The work covered under this section of the Specifications includes providing a technical service representative from the equipment manufacturers furnished under Divisions 11. The technical service representative shall oversee/provide performance inspections, start-up services, performance testing, acceptance testing, and training.

##### 1.3 RESPONSIBILITIES

- A. The Contractor shall be responsible for the furnishing of all plant, labor, equipment, supplies, consumables, chemicals, fees, utilities, appliances, and materials and performing all operations in connection with start-up, testing, inspection, and commissioning of all mechanical and process-related equipment, including the coordination of all performance tests and the furnishing of operating instructions for all equipment as required in the Contract Documents, prior to final acceptance.
- C. The Engineer will be responsible for reviewing and approving the Contractor's testing plan and schedule, witnessing all inspections, start-up tests, functional and performance tests, and assisting with the coordination of plant operations, testing, and training with the Owner.
- D. The Owner will be responsible for coordinating the operation of existing facilities, systems, and equipment to facilitate the Contractor's start-up requirements for the new facilities.

##### 1.4 RELATED WORK

- A. Additional start-up, performance testing, and calibration requirements are specified and included in Division 11 and 13.
- B. Training requirements are specified and included in Divisions 11.

##### 1.5 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittal Procedures:

1. A detailed plan and schedule for completing all required inspection, start-up, and performance tests as specified herein. The plan and schedule shall be approved by the Engineer. The Contractor is required to submit to the Engineer all equipment O&M manuals specified in the Contract Documents at least twenty eight days (28) days in advance of any scheduled equipment inspections or proposed test dates.
2. Detailed test procedures shall be submitted at least fourteen (14) days prior to the Contractor's proposed final inspection, start-up, and performance testing dates. This submittal shall include the proposed testing dates for each piece of equipment, the names of all technical representatives who will perform equipment tests, a testing record form supplied by the manufacturer to collect appropriate test data, a list of any/all laboratory testing required, the specific responsibilities of the Contractor and technical service representative to prepare for and execute the test, all electrical, chemical, water and waste disposal requirements for the tests, and a description of all activities which require coordination or assistance from the Owner.
3. An inspection report prepared by the manufacturer's technical service representative summarizing the results of the final inspection and start-up testing prior to performance testing shall be submitted. The report shall include certification that the equipment is properly installed and ready for operation and results of the test and adjustments performed.
4. Start-up and performance test reports shall be submitted within fourteen (14) days of completion of the tests. The reports shall include all information and results indicated in the detailed test procedures and any supplemental information from laboratory analysis, specified performance compared to actual performance test results, and if performance of equipment is not acceptable, a description of the actions to be taken prior to re-testing the equipment.

## 1.6 COMMISSIONING REQUIREMENTS

### A. General

1. The Contractor shall be responsible for furnishing and installing all of the several kinds and types of equipment required in the treatment facilities, for starting-up and testing each individual piece of equipment, all combinations of equipment as they may operate one in conjunction with another, and the complete system, such that each component and the entire facility operates as a fully functioning system that is acceptable to the Engineer, the Owner, and to any other municipal, State or Federal authorities within whose jurisdiction the operation of the facility may be a concern.
2. Equipment shall be inspected, started-up, and tested for proper operation (rotation, alignment, mechanical and electrical connections, performance) in the presence of the Engineer, and at no additional cost to the Owner.

3. At no time during the commissioning of the facilities shall any equipment or system be operated under a more severe condition than the maximum design condition for which the equipment is rated.
4. All spare parts, tools, lubricants shall be delivered to the Owner prior to performance testing.
5. The following representatives, at a minimum, shall be present simultaneously for the start-up and performance testing dates:
  - a. General Contractor
  - b. Manufacturer's Technical Service Representatives
  - c. Engineer
  - d. Owner and Owner's Representatives

**B. Start-up Activities**

1. All mechanical and electrical equipment shall be checked to verify it is properly connected. Preliminary run-ins of mechanical equipment shall be done to verify that it is operating properly. All systems and related work areas shall be cleaned of all debris and build-up.
2. All safety equipment shall be installed and operating properly prior to any equipment operation or performance testing.
3. Alarm and access control systems shall be tested to show they are capable of transmitting, annunciating, and controlling all specified alarm conditions and security features.
4. Instruments: Contractor shall furnish standards, calibrated meters, and necessary instruments, labor, and equipment to test installed instruments under the direction of the Engineer. Units will be tested to determine their accuracy, precision and efficiency.

**C. Functional Testing and Inspection of Equipment**

1. After the installation of all permanent equipment is complete, and deemed ready for operation by the equipment manufacturer(s), the manufacturer's technical service representative and Contractor shall clean, inspect, start-up, test, calibrate, balance, align, and adjust as necessary all equipment to meet the manufacturer's requirements and all other requirements of the Contract Documents. The inspection and determination of required adjustments shall consider the completeness and integrity of the installed systems including proper electrical, process, and mechanical connections, alignment, clearances, proper rotation, noise, vibration, torque, speed, thrust restraint, and complete initial servicing including required sealing, lubricants, lubrication, and

packing. All adjustments necessary to maintain the equipment warranty shall be made.

2. Conduct functional tests as described above on all individual equipment components until each individual component has achieved one (1) continuous hour of satisfactory operation (one half hour at half design capacity and one half hour at design capacity).
3. The technical service representative shall submit the results of the inspection and functional testing including certification that the equipment was properly installed, is operating as specified, and documentation of all adjustments made.
4. Performance testing on equipment shall not be scheduled or commence until the equipment and systems have passed the functional testing and inspection requirements to the satisfaction of the manufacturer and Engineer.

#### D. Performance Testing

##### 1. General Requirements

- a. Performance tests on all items and systems shall be made at the water treatment facility only after all inspections, start-up activities, and functional tests have been satisfactorily conducted by the Contractor, and the Contractor and Engineer are satisfied that the equipment is operating as specified.
- b. Prior to performance testing of equipment all pipelines and appurtenances shall be inspected, pressure tested, disinfected, and found to be acceptable; and all tanks and basins shall be disinfected and found to be acceptable.
- c. If equipment is unable to operate, initial calibration and/or additional adjustments are required, or representatives are absent, the performance test shall be canceled at that time and full re-scheduling will be required. Damages shall be assessed to the Contractor for Owner's, Owner's Representative, and Manufacturer's Representative time and expenses wasted on scheduling, coordinating and attending the failed performance test.
- d. The performance tests are meant to verify and check the complete performance of the equipment for a fully functioning system, and is not a time for contractors' or manufacturers' representatives to begin or complete major calibrating, testing, and adjusting of their equipment to insure it works or performs as required.

- e. All related costs and fees associated with completing the performance testing requirements shall be furnished by the Contractor and at no additional cost to the Owner.
- f. Once the facilities are fully tested, operational, calibrated and capable of operating in harmony with all new and existing systems, and performing as specified and approved by the Department of Environmental Protection, the Owner shall take occupancy of the equipment and the warranty period shall begin.

2. Performance Tests:

- a. All training of facility personnel as specified in Divisions 11 by manufacturer's technical service representatives shall be completed prior to the full system performance test.
- b. Full System Performance Test: The successful performance of all systems, equipment and components shall be demonstrated to the satisfaction of the Engineer by completing a full system performance test. The performance test will consist of operating each treatment system at design capacity for a period of 4 continuous hours without interruption. Where redundant or multiple treatment systems, process trains, and pumping systems exist, each train shall be operated at design capacity and/or design loading rates separately. Failure of equipment to operate as specified will require the test to be repeated for another 4 hour period.
- c. Full System Demonstration Test: Not required under this project.
- d. Substantial completion and facility acceptance will not be issued until the Full System Performance Test is successfully completed. Satisfactory performance shall be considered achieved once the facility equipment and systems, including the related electrical and instrumentation systems, have been operated and meet all performance criteria for the specified time periods.
- e. Equipment to Meet Requirements: In the event of a failure to demonstrate satisfactory facility performance on the first or any subsequent attempt, it shall be the responsibility of the Contractor to make all the necessary and required changes, replacements, and tests to make the units meet the specified operating and efficiency requirements.
- f. The Contractor shall be fully responsible for the operation and maintenance of the new equipment and systems until the performance test has been completed and substantial completion and facility acceptance has been issued.

## 1.7 GUARANTEE

- A. The Contractor shall guarantee the materials and equipment furnished and the performance thereof to be in accordance with the requirements of the Contract Documents and agrees upon written notice to make promptly and without charge, all necessary changes, corrections, and replacements (including installation of replacement parts) required to make good all defects developing in the material or equipment, under ordinary use and proper care, within a period of twelve months after final acceptance or substantial completion of the treatment facilities.
- B. The manufacturer's technical service representative shall be experienced in the installation, operation and testing of the equipment and/or system he/she shall be responsible for inspecting, starting up and testing. The manufacturer's sales representative shall not be provided as the technical service representative.

## 1.8 OPERATION AND MAINTENANCE MANUALS

- A. Provide in accordance with Section 01730 – Operation and Maintenance Data and as specified.
- B. The Operation and Maintenance Manuals shall be submitted prior to start-up and final testing of equipment
- C. The Contractor shall be responsible for any malfunction of, or damage to the equipment or system resulting from incomplete or incorrect instructions in the manual for the guarantee period specified elsewhere in this Specification.

## 1.9 TREATMENT EQUIPMENT USAGE

- A. Any partial or full usage of the proposed equipment by the Owner, and/or his employees or agents, prior to acceptance shall be the responsibility of the Contractor.

## 1.10 OPERATIONAL EXPENSES

- A. The Contractor shall be responsible for the proper handling, sampling, lab testing and analysis, and disposal of all water and wastes generated from the testing and start-up of the facility.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01700

### CONTRACT CLOSEOUT

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
  - 1. Closeout procedures.
  - 2. Final cleaning.
  - 3. Adjusting.
  - 4. Record Documents.

##### 1.3 RELATED WORK

- A. Cleaning up requirements are included in Section 01710.

##### 1.4 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payment, and sum remaining due.
- D. Submit all warranties.
- E. Submit written notice that all subcontractors and suppliers have been paid in full.
- F. Submit written notice showing the disparities of all insurance filings and claims.
- G. Copy of "Statement of Compliance" filed with the Division of Labor and Workforce Development, as required under the State Wage Rate Provisions.

##### 1.5 RECORD DOCUMENTS

- A. Maintain on site, one set of the following documents; actual revisions to the Work shall be recorded in these documents:
  - 1. Contract Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Change orders and other Modifications to the Contract
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Written interpretations and clarifications.
  - 7. Field orders.
  - 8. Field test reports properly verified.
  - 9. Upon completion of the project Record Drawings shall be submitted to the Engineer.
- B. Store As-built Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
  - 1. Manufacturer's name, address and telephone number and product model and serial number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and Modifications.
- E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured horizontal and vertical location of excavation limits referenced to permanent surface bounds.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension of detail.
  - 5. Details not on original Contract Drawings.

## 1.6 FINAL CLEANING

- A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
  - 1. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains,



spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.7 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.8 FIRST YEAR ANNIVERSARY INSPECTION

- A. Contractor shall provide Owner with a separate bond for the completion of a first year anniversary inspection as a condition of final payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

## SECTION 01710

### CLEANING UP

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. During its progress, the work and the adjacent areas affected thereby shall be cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
- B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.
- C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
- D. The Contractor shall thoroughly clean all materials and equipment installed by him and his sub-contractors, and on completion of the work shall deliver it undamaged and in fresh and new-appearing condition.
- E. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practical as work progresses and shall not be left until the end of the contract period.

#### PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

## SECTION 01730

### OPERATION AND MAINTENANCE DATA

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section includes procedural requirements for compiling and submitting operation and maintenance data required to complete the project.

##### 1.3 RELATED WORK

- A. Division 1 – General Requirements
- B. Division 2 – Site Work
- C. Division 11 – Equipment
- D. Division 13 – Special Construction

##### 1.4 OPERATING AND MAINTENANCE INSTRUCTIONS AND PARTS LISTS

- A. Where reference is made in the Detailed Technical Specifications to operating and maintenance and spare parts lists, the Contractor shall furnish for each piece of equipment six (6) complete sets giving the information listed below.

- 1. The manual for each piece of equipment shall be a separate document with the following specific requirements:

- a. Contents:

- 1) Table of contents and index;
- 2) Brief description of each system and components;
- 3) Starting and stopping procedures;
- 4) Special operating instructions;
- 5) Routine maintenance procedures;
- 6) Clean and concise manufacturer's printed operating and maintenance instructions, adjustment, lubrication and other maintenance of equipment including: parts list, illustrations, and diagrams;
- 7) One copy of each wiring diagram;
- 8) One copy of each approved shop drawing and each Contractor's coordination and layout drawing;

- 9) List of spare parts, manufacturer's price, and recommended quantity; and
  - 10) Name, address, and telephone numbers of local service representatives.
- b. Material:
- 1) Loose leaf on 60 pound, punched paper;
  - 2) Holes reinforced with plastic cloth or metal;
  - 3) Page size, 8-1/2-in. by 11-in.;
  - 4) Diagrams, illustrations, and attached foldouts as required of original quality, reproduced by dry copy method; and
  - 5) Covers: oil, moisture, and wear resistant 9 X 12 size.
- B. Such instructions and parts lists shall be completely and neatly annotated so that only the specific equipment and features furnished are clearly indicated. References to other sizes and types or models of similar equipment shall be deleted or neatly lined out.
- C. Such instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site. Each submittal shall be accompanied by a transmittal form identifying the information included. Each submittal shall be reviewed by the Engineer for compliance with the above requirements.
- D. If a submittal is acceptable, all six copies will be retained by the Engineer. If deficiencies are found, one copy will be retained by the Engineer and five copies with the deficiencies, noted, will be returned to the Contractor. The copy retained by the Engineer shall not count toward the six complete acceptable sets required herein.
- E. At the Engineer's discretion, he may retain all six copies and request only supplemental information from the Contractor.

## 1.5 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project, names, addresses, and telephone numbers of Engineer, subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone number of Subcontractors and suppliers; including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. A list of all parts for the equipment with each part identified by a functional name, the part manufacturer's name and a unique part number, (normally the part manufacturer's alpha-numeric designation). A list of parts keyed by non-unique item numbers to a sectional drawing will not be adequate to fulfill this requirement.

- E. All components of each system, e.g., pump motor, coupling, and drive, shall be combined in a single submittal with the above data provided for each component.
- F. Drawings: Supplement product data to illustrate relations of component parts, and data applicable to installation. Delete inapplicable information.
- G. Type Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's printed instructions specified.
- H. Warranties and Bonds are as specified in Section 01740 - Warranties and Bonds.

#### 1.6 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's printed recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing, applicable reference standards, chemical composition, and details of installation. Provide printed recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual product specification sections.
- E. Provide a listing in Table of Contents for design data, if provided by Contractor, with tabbed fly sheet and space for insertion of data.

#### 1.7 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. For each Item of Equipment and Each System provide the following:
  - 1. Description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include certified performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
  - 2. Panelboard Circuit Directories including electrical service characteristics, controls and communications, and color coded wiring diagrams as installed.
  - 3. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences; regulation, control, stopping, shut-down, and emergency instructions; and summer, winter, and any special operating instructions.

4. Maintenance Requirements:
    - a. Route procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
    - b. Servicing and lubrication schedule, with list of lubricant type, frequency and method of lubrication. Any components which do not require lubrication or any expendable components which are not normally serviced shall be clearly noted as such.
    - c. Manufacturer's printed operation and maintenance instructions.
    - d. Sequence of operation by controls manufacturer.
    - e. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
    - f. Lubrication and maintenance schedules shall be similar to that specified in Section 01300 - Submittal Procedures.
  5. Control diagrams by controls manufacturer as installed.
  6. Contractor's coordination drawings, with color coded piping diagrams as installed.
  7. Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
  8. List of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
  9. Test and balancing reports as specified.
  10. Additional Requirements: As specified in individual product specification section.
- B. Provide a listing in Table of Contents for design data, if provided by Contractor, with tabbed fly sheet and space for insertion of data.

#### 1.8 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times. Where specified in the Detailed Technical Specification Sections for specific equipment or systems, the Contractor shall have instructions video taped while they are being given to Owner's personnel. Video taping shall be performed by a person or organization experienced in the production of tapes and shall include the entire instruction session(s) and all questions and answers. Provide two tapes. Tapes shall

become the property of the Owner.

- B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. Prepare and insert additional data in Operations and Maintenance Manual when need for such data becomes apparent during instruction.
- D. Provide a completed and filled-out Equipment Manufacturer's Certificate of Installation, Testing and Instruction form attached to the end of this section.
- E. Training/Instruction shall be scheduled separately from installation checkout and testing, unless approved by the Engineer.

#### 1.9 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall arrange for a qualified service representative from each company manufacturing or supplying the equipment specified in the Detailed Technical Specification Sections.
- B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before it is operated by others, the representative shall inspect, operate, test, and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:
  - 1. Soundness (without cracked or otherwise damaged parts).
  - 2. Completeness in all details, as specified.
  - 3. Correctness of setting, alignment, and relative arrangement of various parts.
  - 4. Adequacy and correctness of packing, sealing, and lubricants.
- C. The operation, testing, and adjustment shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.
- D. On completion of his work, the manufacturer's or supplier's representative shall submit in triplicate to the Engineer a complete signed report of the result of his inspection, operation, adjustments, and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a Certificate of Compliance stating that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.
- E. After the Engineer has reviewed the reports from the manufacturers' representatives, the Contractor shall make arrangements to have the manufacturers' representatives



present when the field acceptance tests are made.

- F. Refer and conform to the additional requirements specified in Section 01400 - Quality Assurance.

#### 1.10 NAMEPLATES

- A. With the exceptions mentioned below, each piece of equipment shall be provided with a substantial nameplate of non-corrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate.
- B. This requirement shall not apply to standard, manually operated hydrants or to gate, butterfly, globe, check, and plug valves.
- C. Each process valve shall be provided with a substantial tag of non-corrodible metal securely fastened in place and inscribed with an identification number in conformance with the Valve Mechanical Schedule indicated on the drawings or furnished later by the Engineer.

#### 1.11 LUBRICANTS

- A. During testing and prior to acceptance, the Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this contract.

#### 1.12 SPECIAL TOOLS

- A. For each type of equipment furnished by him, the Contractor shall provide a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.
- B. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.
- C. Special tools shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such special tools until completion of the work, at which time they shall be delivered to the Owner.

### PART 2 - PRODUCTS - (NOT USED)

### PART 3 - EXECUTION - (NOT USED)

EQUIPMENT MANUFACTURER'S CERTIFICATE OF INSTALLATION,  
TESTING AND INSTRUCTION

Owner – Prudence Island Water District

Project – Water System Chlorination & Pretreatment

H2Olson Project No.: 109.20.01

EQUIPMENT SPECIFICATION SECTION \_\_\_\_\_

EQUIPMENT DESCRIPTION \_\_\_\_\_

I \_\_\_\_\_, Authorized representative of  
(Print Name)

\_\_\_\_\_  
(Print Manufacturer's Name)

hereby CERTIFY that \_\_\_\_\_  
(Print equipment name and model with serial No.)

installed for the subject project (has) (have) been installed in a satisfactory manner, (has) (have) been satisfactorily tested, (is) (are) ready for operation, and that Owner assigned operating personnel have been suitably instructed in the operation, lubrication, and care of the unit(s) on

Date: \_\_\_\_\_ Time: \_\_\_\_\_

CERTIFIED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
(Signature of Manufacturer's Representative)

WITNESSED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
(Signature of Owner's Representative)

OWNER'S ACKNOWLEDGMENT OF MANUFACTURER'S INSTRUCTION

(I) (We) the undersigned, authorized representatives of the \_\_\_\_\_  
and/or Plant Operating Personnel have received classroom and hands-on instruction on the operation,  
lubrication, and maintenance of the subject equipment and (am) (are) prepared to assume normal  
operational responsibility for the equipment:

\_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_ Date: \_\_\_\_\_

\_\_\_\_\_ Date: \_\_\_\_\_

END OF SECTION

## SECTION 01740

### WARRANTIES AND BONDS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.

##### 1.3 RELATED WORK

- A. Refer to General Conditions of the Contract for the general requirements relating to warranties and bonds.
- B. General closeout requirements are included in Section 01700 - Contract Closeout.
- C. Specific requirements for warranties for the Work and products and installations that are specified to be under warranty are included in the individual Sections of Division 2 through 16.
- D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

##### 1.4 SUBMITTALS

- A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement data for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.
- B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.
- C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for approval prior to final execution.

- D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.
- E. At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the "Warranties and Bonds" binder.
- F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-in. by 11-in. paper.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the "Warranties and Bonds" binder, with each item identified with the number and title of the specification Section in which specified, and the name of the product or work item.
- H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer, supplier, and manufacturer.
- I. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name, address, and telephone numbers of the Contractor and equipment supplier.
- J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

#### 1.5 WARRANTY REQUIREMENT

- A. Related Damages and Losses: When correcting Work under warranty that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of Work under warranty.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding; reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.
- E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

#### 1.6 DEFINITION

- A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

#### PART 2 - PRODUCTS - (NOT USED)

#### PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 02020

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies equipment and materials for an erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The erosion and sediment control provisions detailed on the Drawings and specified herein are the minimum requirements for erosion controls. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section. Related Sections include the following:
  - 1. Section 02070 – Selective Demolition
  - 2. Section 02273 – Geotextile Fabric

1.3 SUBMITTALS

- A. Proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:
  - 1. List of proposed materials including manufacturer’s product data.
  - 2. Perimeter (Limit of Work) Erosion Controls damaged during construction shall be replaced immediately and installed per the Details. Schedule of any additional erosion control program indicating specific dates for implementing programs in each major area of work, including dewatering sedimentation basin(s) shall be submitted prior to installation.

- B. The following samples shall be submitted:

<u>Sample</u>	<u>Size</u>
Filter Fabric (Woven and Non-woven)	12 X 12 in.

1.4 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
  - 1. Rhode Island Soil Erosion and Sediment Control Handbook prepared by the U.S. Department of Agriculture Soil Conservation Service and the R.I. Department of Environmental Management.

## 1.5 EROSION CONTROL PRINCIPLES

### A. Erosion Control Principles

The following erosion control principles shall apply to the land grading and construction phases:

1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.
2. Whenever feasible, natural vegetation shall be retained and protected.
3. Extent of area which is exposed and free of vegetation and duration of its exposure shall be kept within practical limits.
4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance. Prolonged exposure of unstabilized soil shall not exceed 60 days.
5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.
6. Sediment shall be retained on-site.
7. Dewatering sedimentation basin(s) shall be installed prior to dewatering operations. Dewatering basins shall not be installed within 50 feet of the wetland boundary.

### B. Erosion Protection

Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two months, and temporary erosion protection when erosion exposure period is expected to be less than two months.

1. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.



2. Temporary erosion protection shall be accomplished by covering with an erosion protection material, as appropriate for prevailing conditions.
3. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 3:1 (horizontal: vertical) cut slopes shall be limited to a grade of 2:1.

PART 2 - PRODUCTS

2.1 HAY BALES

- A. Hay bales for construction of erosion control devices shall be new, firm, bound salt marsh hay bound with biodegradable twine.

2.2 STRAW WATTLE

- A. Straw wattle for construction of erosion control devices shall be new, 12” diameter filter sock, secured with wooden stakes placed on 10’ centers. Filter media shall be blown/placed mulch compost or other approved filter material.

2.3 TEMPORARY SEED COVER

- A. If required, seed mixture for temporary cover by hydroseeding application shall conform to the following:

<u>Quantity per 1000 sq. ft. Coverage</u>	<u>Material</u>
27-1/2 lb.	Wood Fiber Mulch
4 lb.	Seed
1/2 lb.	Annual Ryegrass
22 lb.	10-6-4 Fertilizer
69 gal.	Water

- B. Hydroseeding Equipment

Hydroseeding equipment may be either portable or truck mounted, with dual agitation, a minimum working volume of 1000 gallons and a minimum spray range of 80 ft.

1. Hydroseeding equipment must be capable of uniformly applying the slurry mix including wood fiber mulch if required, at the specified rate, and at the required locations.
2. Hydromulching equipment, either trailer or truck mounted, must be capable of uniformly applying straw or hay mulch at a minimum mulching rate of 8 tons per hour, at a distance of not less than 80 ft.

2.4 EROSION CONTROL BLANKET

- A. All loam and seeded slopes 6:1 or steeper shall have erosion control blanket installed.

- B. Erosion control blanket shall be Curlex CL as manufactured by American Excelsior or engineer approved equal.

### PART 3 - EXECUTION

#### 3.1 HAY BALE DIKE

- A. Bales shall be constructed and installed as indicated on the Drawings or as necessary to control run-off during contractors' site work operations. Bales shall be placed in a row with ends tightly abutting the adjacent bales. Each bale shall be embedded in the soil a minimum of 4 in. Bales shall be securely anchored in place by wooden stakes driven through the bales. The first stake in each bale shall be angled toward the previously laid bale to force the bales together.

#### 3.2 HAY BALE CHECK DAM

- A. Check dams shall be constructed and installed as necessary to control site runoff from stormwater or dewatering operations.

#### 3.3 HYDROSEEDING

- A. If required for long-term disturbance greater than 60 days, seed for temporary cover shall be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed, fertilizer, mulch and water shall be mixed and applied to achieve application quantities specified. Material shall be applied in 2 equal applications, with the equipment during the second pass moving perpendicular to direction employed during the first pass. Hydroseeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.
- B. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.
- C. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.

#### 3.4 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

- A. Wetland area, water courses, and drainage swales adjacent to construction activities shall be monitored continuously for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.
- B. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.
- C. Erosion Control Devices

1. Sediment behind the erosion control device shall be checked twice each month and after heavy rain. Silt shall be removed if greater than 6 in. deep.
2. Condition of erosion control devices shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.
3. Hay bales shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.
4. Sediment deposits shall be properly disposed of, in a location and manner which will not cause sediment nuisance elsewhere.

D. Removal of Erosion Control Devices

1. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded.
2. Erosion protection material shall be kept securely anchored until acceptance of the entire Project and receipt of Certification of Completion from Millbury Conservation Commission

END OF SECTION



## SECTION 02050

### TREE PROTECTION AND TRIMMING

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. This Section includes the protection and trimming of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction. It also covers tree pruning when necessary in the vicinity of the site Work.

##### 1.2 RELATED SECTIONS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section. Related Sections include the following:
  - 1. Section 02020 – Erosion and Sediment Control
  - 2. Section 02070 – Selective Demolition

##### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of engineers and owners, and other information specified.
- C. Certification: From a qualified arborist that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

##### 1.4 QUALITY ASSURANCE

- A. Tree Service Qualifications: An experienced tree service firm to be consulted as necessary.
- B. Arborist Qualifications: An arborist certified by the International Society of Arboricultural or licensed in the jurisdiction where Project is located, to be consulted as necessary.
- C. Tree Pruning Standards: Comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance--Standard Practices," unless more stringent requirements are indicated.

- D. Preinstallation Conference: Conduct conference at Project site prior to start of work.
  - 1. Before starting tree pruning protection and trimming, meet with representatives of authorities having jurisdiction, Owner, Engineer, consultants, and other concerned entities. Review tree pruning protection and trimming procedures and responsibilities. Notify participants at least three working days before convening conference. Record discussions and agreements and furnish a copy to each participant.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Drainage Fill: Selected 2 1/2 inch crushed stone, and with not more than 10 percent passing a 3/4-inch sieve.
- B. Topsoil: Fertile, friable, surface soil, containing natural loam and complying with ASTM D 5268. Provide topsoil that is free of stones larger than 1 inch in any dimension and free of other extraneous or toxic matter harmful to plant growth. Obtain topsoil only from well-drained sites where soil occurs in depth of 4 inches or more; do not obtain from bogs or marshes.
- C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers, as manufactured by US Fabrics, model # US 120NW or approved equal.

## PART 3 – EXECUTION

### 3.1 PREPARATION

- A. Protect tree root systems from damage due to noxious materials caused by runoff or spillage while mixing, placing, or storing construction materials. Protect root systems from flooding, eroding, or excessive wetting caused by dewatering operations.
- B. Do not store construction materials, debris, or excavated material within the drip line of remaining trees. Do not permit vehicles or foot traffic within the drip line; prevent soil compaction over root systems.
- C. Do not allow fires under or adjacent to remaining trees or other plants.

### 3.2 EXCAVATION

- A. Install shoring or other protective support systems to minimize sloping or benching of excavations.
- B. Do not excavate within drip line of trees, unless otherwise indicated.
- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
  - 1. Relocate roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and relocate them without breaking. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 3 inches back from new construction.
  - 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

### 3.3 REGRADING

- A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by qualified arborist, unless otherwise indicated.
  - 1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.
- B. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- C. Moderate Fill: Where existing grade is more than 6 inches, but less than 12 inches, below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:
  - 1. Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of grade.
  - 2. Place filter fabric with edges overlapping 6 inches minimum.

3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

### 3.4 TREE PRUNING

- A. Prune remaining trees affected by temporary and new construction as indicated on the plans.
- B. Prune remaining trees, if any, to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by qualified arborist.
- C. Pruning Standards: Prune trees according to ANSI A300.
- D. Cut branches with sharp pruning instruments; do not break or chop.

### 3.5 TREE REPAIR AND REPLACEMENT

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.
- B. Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to a normal growth pattern.
  1. Provide new trees of the same size and species as those being replaced; plant and maintain as specified.
  2. Provide new trees of 6-inch caliper size and of a species selected by Engineer when trees more than 6 inches in caliper size, measured 12 inches above grade, are required to be replaced.
- C. Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch diameter holes a minimum of 12 inches deep at 24 inches (on center). Backfill holes with an equal mix of augered soil and sand.

### 3.6 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material, displaced trees, roots, stumps and excess chips from Owner's property.

END OF SECTION



SECTION 02060  
SITE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Limits of subgrade preparation are as indicated on the Drawings. Miscellaneous trash and debris shall be removed and disposed of legally off site. This Section also includes the following:
  - 1. Removing damaged trees, limbs, stumps and roots.
  - 2. Protecting existing trees and vegetation to remain.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. Related Sections include the following:
  - 1. Section 02020 – Erosion and Sediment Control
  - 2. Section 02050 – Tree Protection and Trimming
  - 3. Section 02070 – Selective Demolition

1.3 SUBMITTALS

- A. No submittals required under this section

1.4 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled, managed and reused, or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site prior to commencement of earthwork operations for subgrade preparation, excavation and earth support, dewatering and discharge and stockpile locations.
- B. Comply with governing EPA notification regulations before starting earthwork operations. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, parking lots, streets, walks, and other adjacent occupied or used water treatment facilities during earthwork operations.
  - 1. Do not close or obstruct streets, walks, parking lots, or other adjacent occupied or used water treatment facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Approval for performing indicated removal and alteration work on property adjoining Owner's property (if any) will be obtained by Owner before award of Contract.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated in accordance with Erosion Control and Demolition plan, or if not indicated then where acceptable to the Owner.
- D. Notify utility locator service for area where Project is located before site clearing operations begin.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Establish and stake out project construction baseline with stakes installed at 50-ft intervals. Protect and maintain survey benchmarks, and control points from disturbance during construction.
- B. Install erosion control barriers.
- C. Prior to construction provide additional erosion-control measures and dewatering sedimentation basins as necessary to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- D. Locate and clearly flag trees and vegetation to remain or to be relocated as approved by the Engineer, prior to commencement of work.
- E. Location of existing utilities and improvements on Existing Conditions plan are approximate only. Contractor shall field locate and verify all utilities and improvements prior to commencement of work under this section. Contractor shall notify "Dig Safe" and the Prudence Island Water District to verify the location, depth, and size of the existing site utilities and utility structures prior to the commencement of work under this section.

- F. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 EARTHWORK OPERATIONS

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots (if required).
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
  - 3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 24 inches below exposed subgrade.
  - 4. Use only hand methods for grubbing within drip line of remaining trees.
  - 5. All debris to be removed from site and properly disposed of.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding 8-inches loose depth, and compact each layer to a density equal to adjacent original ground.

### 3.3 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable soil, obstructions, demolished vegetation materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION



SECTION 02070  
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Work to include demolition of indicated existing pavement areas, utilities, structures, and amenities as indicated on the Drawings or otherwise effected by earthwork operations.
- B. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option and in full compliance with all applicable disposal regulations.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract. Other Specification Sections that directly relate to work of this section include, but are not limited to:
  - 1. Section 02020 – Erosion and Sediment Control
  - 2. Section 02050 – Tree Protection and Trimming
  - 3. Section 02060 – Site Preparation
  - 4. Section 02200 – Earthwork

1.3 SUBMITTALS

- A. Two (2) copies of photographs and videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

1.4 DEFINITIONS: As follows:

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
- B. Salvage and Protect: Items indicated to be salvaged remain the Owner's property. Remove, clean, and store items to protect against damage. Stockpile in Owner's designated storage area.

- C. Remove and Reinstall: Remove items indicated; clean, service, repair, and otherwise prepare them for reuse; store and protect against damage. Make available for Engineer's inspection. Reinstall items in locations indicated.
- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Engineer, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

## 1.5 RECORD DRAWINGS

Provide Record Drawings at Project closeout according to Division 1 Section 01700 "Contract Closeout."

- A. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

## 1.6 REGULATORY REQUIREMENTS

- A. Comply with governing RI DEM, and EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Owner will occupy portions of the facilities & site immediately adjacent to selective demolition areas. Conduct selective demolition so that Owner's operations will not be disrupted. Provide not less than 72 hours notice to Owner of activities (if any) that may affect Owner's existing water treatment plant operations.
- C. Owner assumes no responsibility for actual condition of facilities or items to be selectively demolished, or removed and reused.
- D. Storage or sale of removed items or materials on-site will not be permitted without Owner permission. Excavated soils, excess to project requirements, will become the property of the Contractor.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

- 3.1 It is the intent that the existing water treatment plant remains fully operational during construction of the new plant, until such time that the flows from the existing plant are switched over to the new plant. Prior to commencing any excavation, clearing or demolition, the Contractor shall take all actions necessary to fully protect the existing facilities from damage. The Contractor shall take all actions required to repair any damage and return to its existing condition.
- 3.2 Survey the condition of the site to determine whether removing any element might result in undesirable damage of any portion of adjacent facilities during selective demolition.

- 3.3 Perform surveys, as the Work progresses to detect hazards resulting from selective demolition and earthwork activities.
- 3.4 Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition and earthwork operations.
- 3.5 Utility Requirements: Locate, identify, shut off, disconnect, and seal properly or cap off indicated utility services serving facilities to be selectively demolished.
- 3.6 Conduct demolition and earthwork operations and remove debris to ensure minimum interference with roads, parking lots, streets, walks, and other adjacent occupied and used facilities.
- 3.7 Conduct demolition operations to prevent injury to people and damage to adjacent buildings, facilities, and site improvements to remain. Ensure safe passage of people around selective demolition area.
- 3.8 Use water mist and other suitable methods as necessary to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
- 3.9 Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- 3.10 Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.
- 3.11 Demolish and remove existing construction only to the extent required by new construction and as indicated on the Drawings. Contractor is responsible for any cutting and patching that is required.
- 3.12 Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.
- 3.13 Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- 3.14 Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.
- 3.15 Disposal: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- 3.16 Do not burn demolished materials.
- 3.17 Transport demolished materials off Owner's property and legally dispose of them, if not designated for salvage by Owner or reuse.

- 3.18 In areas where bituminous concrete is to be removed, the edge of any bituminous concrete to remain must be a sawcut edge.
- 3.19 Items to be removed and reset may be stored on site at a location approved by the Owner.

END OF SECTION



## SECTION 02140

### DEWATERING AND DISCHARGE

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section includes the following:

1. Design, furnish, operate, maintain, and remove temporary dewatering systems to control groundwater and surface water to maintain stable, undisturbed subgrades, and permit work to be performed under dry and stable conditions. Work to be done as part of dewatering includes, but is not limited to:
  - a. Lower the groundwater level.
  - b. Lower hydrostatic pressure.
  - c. Prevent surface water from entering the excavation during construction.
  - d. Implement erosion control measures for disposing of discharge water.
  - e. Provide groundwater recharging systems as specified and as indicated.
  - f. Provide and monitor observation wells and geotechnical instrumentation as specified and indicated.
2. Groundwater within the excavation area shall be lowered to at least 2 feet [60 cm.] below the lowest excavation levels as specified and as indicated. Direct discharge into the wetland resource area will not be allowed.
3. Common dewatering methods include, but are not limited to, sump pumping, deep wells, well points, vacuum well points or any combinations thereof.

- B. Related sections include the following:

1. Section 02160 - Temporary Excavation Support Systems
2. Section 02200 - Earthwork

### 1.3 SUBMITTALS

- A. Shop Drawing: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
1. Qualification of the Contractor's dewatering specialist's or firm's qualifications a minimum of four (4) weeks prior to execution of any dewatering. The submittal shall include, but not be limited to:
    - a. Qualifications of specialist's or firm's Registered Professional Engineer as specified in Paragraph 1.4 B.
    - b. Qualifications of specialist's or firm's field representative, as specified in paragraph 1.4 B, who shall oversee the installation, operation and maintenance of the dewatering system.
  2. Submit a dewatering and discharge plan at least two weeks prior to start of any dewatering operation. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:
    - a. Dewatering plan and details stamped and signed by a Registered Professional Engineer.
    - b. Certificate of Design: Refer to Section 01300 for form.
    - c. A list of equipment including, but not limited to, pumps, prime movers, and standby equipment.
    - d. Detailed description of dewatering, discharge, maintenance, and system removal procedures.
    - e. Monitoring plan and details, including, but not limited to, locations of observation wells, and geotechnical instruments such as settlement markers (reference points on structures) and piezometers, and frequency of reading the monitoring devices.
    - f. Erosion/sedimentation control measures, and methods of disposal of pumped water.
    - g. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.

3. Measurement records consisting of observation well groundwater records and the geotechnical instrumentation readings within one day of monitoring.
4. A modified dewatering plan within 24 hours, if open pumping from sumps and ditches results in boils, loss of fines or softening of the ground.

#### 1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Employ the services of a dewatering specialist or firm having the following qualifications:
  1. Have completed at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years.
  2. Retain the services of a Registered Professional Engineer (in the state where the project is located) having a minimum of five (5) years experience in the design of well points, deep wells, recharge systems, or equal systems.
  3. Retain the services of a field representative having a minimum of 5 years experience in installation of well points, deep wells, recharge systems, or equal systems.
- C. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade, and modify system to perform as specified at no additional cost to the Owner.
- D. Notify the Engineer immediately if any settlement or movement is detected on structures. If the settlement or movement is deemed by the Engineer to be related to the dewatering, take actions to protect the adjacent structures and submit a modified dewatering plan to the Engineer within 24 hours. Implement the modified plan and repair any damage incurred to the adjacent structures at no additional cost to the Owner.
- E. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Engineer.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610 and as specified.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Provide settlement markers, piezometers and/or any other geotechnical instruments in accordance with the submitted dewatering plan or as specified.

- B. Provide casings, well screens, piping, fittings, pumps, power and other items required for dewatering system.
- C. Provide sand and gravel filter around the well screen. Wrapping geotextile fabric directly around the well screen shall not be allowed.
- D. When deep wells, well points, or vacuum well points are used, provide pumping units capable of maintaining high vacuum and handling large volumes of air and water at the same time.
- E. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.
- F. Provide and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.
- G. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.
- H. Provide cement grout having a water cement ratio of 1 to 1 by volume.

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Execution of any earth excavation, installing earth retention systems, and dewatering shall not commence until the related submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed and the geotechnical instrumentation has been installed.
- B. Furnish, install and maintain dewatering system in accordance with the dewatering plan.
- C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of work ongoing or previously completed.
- D. Do not excavate until the dewatering system is operational.
- E. Unless otherwise specified, continue dewatering uninterrupted until all structures, pipes, and appurtenances below groundwater level have been completed such that they will not be floated or otherwise damaged by an increase in groundwater elevation.
- F. Discontinue open pumping from sumps and ditches, if such pumping is resulting in boils, loss of fines, softening of the ground, or instability of the slopes. Modify dewatering plan and submit to the Engineer at no additional cost to the Owner.
- G. Where subgrade materials are disturbed or become unstable due to dewatering

operations, remove and replace the materials in accordance with Section 02200 at no additional cost to the Owner.

H. Dewatering Discharge:

1. Install and monitor recharge systems when specified and/or indicated and in accordance with the submitted dewatering plan.
2. Install sand and gravel filters in conjunction with well points and deep wells to prevent the migration of fines from the existing soil during the dewatering operation.
3. Transport pumped or drained water to discharge location without interference to other work, damage to pavement, other surfaces, or property.
4. Provide separately controllable pumping lines.
5. The Engineer reserves the right to sample discharge water at any time. If discharge water quality is poor, the Engineer may request additional measures to improve water quality.
6. The Contractor shall not discharge silty water in the wetland resource area.
7. Immediately notify the Engineer if suspected contaminated groundwater is encountered. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations.

I. Monitoring Devices and Records:

1. Install, maintain, monitor and take readings from the observation wells and geotechnical instruments in accordance with the dewatering plan.
2. Install settlement markers on structures within a distance equal to twice the depth of the excavation, from the closest edge of the excavation. Conduct and report settlement surveys to 0.001 ft.

J. Install and maintain erosion/sedimentation control devices at the point of discharge as indicated or specified and in accordance with the dewatering plan.

K. Removal:

1. Do not remove dewatering system without written approval from the Engineer.
2. Backfill and compact sumps or ditches with screened gravel or crushed stone wrapped with geotextile fabric in accordance with Section 02200.
3. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

3.2 CONTRACT CLOSEOUT

- A. Provide in accordance with section 01700.

END OF SECTION

## SECTION 02160

### TEMPORARY EXCAVATION SUPPORT SYSTEMS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

A. This section includes the following:

1. Design, furnish and install temporary excavation support systems as required to maintain lateral support, prevent loss of ground, limit soil movements to acceptable limits and protect from damage existing and proposed improvements including, but not limited to, pipelines, utilities, structures, roadways, and other facilities.
2. Common types of excavation support system include, but are not limited to, singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheetpile wall, timber sheetpile wall, trench box, or combinations thereof. Trench box temporary excavation support system is only acceptable for pipe or utility trench excavations. Temporary unsupported open cut excavation with stable sloping sides is allowed where applicable.
3. Wherever the word "sheeting" is used in this section or on the contract drawings, it shall be in reference to any type of excavation support system specified except trench box.
4. Construction of the temporary excavation support systems shall not disturb the existing structures or the completed proposed structures. Damage to such structures shall be repaired by the Contractor at no additional cost to the Owner.
5. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper installation, maintenance or design of the temporary excavation support systems. The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the Owner.

##### 1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section, and:
1. Section 02140 – Dewatering and Discharge
  2. Section 02200 – Earthwork

### 1.3 SUBMITTALS

- A. Shop Drawing: Submit the following in accordance with Section 01300 - SUBMITTALS:
1. Submit the following qualifications four (4) weeks prior to the construction:
    - a. Qualifications of Contractor's temporary excavation support system designer as specified in Paragraph 1.4 D.
    - b. Qualifications of Contractor's temporary excavation support system installer as specified in Paragraph 1.4 E.
    - c. Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.4 F, if a tieback system is utilized.
    - d. Qualifications of Contractor's temporary excavation support system installation supervisor as specified in Paragraph 1.4 G.
  2. Submit a temporary excavation support plan stamped and signed by a Rhode Island Registered Professional Engineer at least two weeks prior to start of the construction. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:
    - a. Proposed temporary excavation support system(s), details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.
    - b. Certificate of Design: Refer to Section 01300 for form.
    - c. If utilizing a tieback system, include tieback installation procedures and criteria for acceptance of tiebacks for performance and proof tests. Submit the tieback testing results to the Engineer for information only.
    - d. Requirements of dewatering during the construction, per Section 02140.
    - e. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.



- f. List of equipment used for installing the excavation support systems.
3. Submit a Construction Contingency Plan specifying the methods and procedures to maintain temporary excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.
  4. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:
    - a. Survey locations of the temporary excavation support systems, including coordinates of the ends and points of change in direction.
    - b. Type of the temporary excavation support system.
    - c. Elevations of top and bottom of the excavation support systems left in place.

#### 1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Conform to the requirements of the OSHA Standards and Interpretations: "Part 1926 Subpart P - Excavation, Trenching, and Shoring", and all other applicable laws, regulations, rules, and codes.
- C. All welding shall be performed in accordance with AWS D1.1.
- D. Prepare design, including calculations and drawings, under the direction of a Professional Engineer registered in Rhode Island and having the following qualifications:
  1. Not less than ten (10) years experience in the design of specific temporary excavation support systems to be used.
  2. Completed not less than five (5) successful temporary excavation support system projects of equal type, size, and complexity within the last five (5) years.
- E. Temporary Excavation Support System Installer's Qualifications:
  1. Not less than three (3) years experience in the installation of similar types and equal complexity as the proposed system.
  2. Completed not less than three (3) successful excavation support systems of similar type and equal complexity as the proposed system.
- F. If utilizing a tieback system, employ an independent testing laboratory to test the tieback system with the following qualifications:

1. Be accredited by the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program.
  2. Employ personnel conducting testing who are trained in the methods and procedures to test and monitor tieback systems of similar type and equal complexity, as the proposed system.
  3. Have not less than five (5) years experience in testing of tieback systems of similar type and equal complexity as the proposed system.
  4. Have successfully tested at least three (3) tieback systems of similar type and equal complexity as the proposed system.
- G. Install all temporary excavation support systems under the supervision of a supervisor having the following qualifications:
1. Not less than five (5) years experience in installation of systems of similar type and equal complexity as the proposed system.
  2. Completed at least five (5) successful temporary excavation support systems of similar type and equal complexity as the proposed system.

## 1.5 DESIGN CRITERIA

- A. Design of temporary excavation support systems shall meet the following minimum requirements:
1. Support systems shall be designed for earth pressures, hydrostatic pressure, equipment, temporary stockpiles, construction loads, and other surcharge loads.
  2. Design a bracing system to provide sufficient reaction to maintain stability.
  3. Limit movement of ground adjacent to the excavation support system to be within the allowable ground deformation as specified.
  4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced temporary excavation support systems shall not be less than 5 feet below the bottom of the excavation.
  5. Design temporary excavation support systems to withstand an additional 2 feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.
  6. Maximum width of pipe trench excavation shall be as indicated on the drawings.

7. Do not cast permanent structure walls directly against excavation support walls.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Store sheeting and bracing materials to prevent sagging which would produce permanent deformation. Keep concentrated loads which occur during stacking or lifting below the level which would produce permanent deformation of the material.

## 1.7 PROJECT/SITE CONDITIONS

- A. Subsurface Conditions: Refer to Appendix of the Specifications.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.
- B. Steel Sheet Piling: ASTM A328, continuous interlocking type.
- C. Timber Lagging Left in Place: Pressured treated per appropriate AWWA standards.
- D. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.
- E. Raker Ties: ASTM A615 Grade 60.
- F. Cement Grout Materials and Admixtures for Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.
- G. Concrete: Refer to Section 03300.
- H. Tamping tools adapted for backfilling voids after removal of the excavation support system.
- I. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Installation of the temporary excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed.

- B. Install excavation support systems in accordance with the temporary excavation support plan.
- C. If utilizing a tieback system, all performance and proof tests shall be conducted in the presence of the Engineer. Testing performed without the Engineer present will not be accepted. Repeat testing in the Engineer's presence at no additional cost to the Owner.
- D. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.
- E. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of work ongoing or previously completed.
- F. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.
- H. Continuously monitor movements of the ground adjacent to excavation support systems and adjacent structures. In event of the measured movements approaching or exceeding the allowable movements, take immediate steps to arrest further movement by revising procedures such as providing supplementary bracing, filling voids behind the trench box, supporting utilities or other measures (Construction Contingency Plan) as required.
- I. Notify utility owners if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owners permission or have the utility owner make the modifications at no additional cost to Owner.

### 3.2 GROUND DEFORMATION ADJACENT TO EXCAVATION SUPPORT SYSTEMS

- A. Criteria for “threshold” and “limiting” movements of wall elements of excavation support system have been established as follows:
  - 1. “Threshold” Horizontal Movement:
 

Dx = No greater than 1.25 inch where no buildings are present within 25 ft. of support system

Dx = No greater than 0.5 inch where buildings are present within 25 ft. of support system.

Where  
Dx = measured horizontal wall movement at any level.
  - 2. “Limiting” Horizontal Movement:
 

Dx = No greater than 2.0 inches where no buildings are present within 25 ft. of support system

$D_x$  = No greater than 0.75 inch where buildings are present within 25 ft. of support system.

- B. The Contractor shall notify the Engineer and shall take immediate steps to control further movement by revising his procedures, providing supplemental bracing or other measures (working 24 hours per day or temporarily terminating work in the area of movement if necessary) as required if any of the following occur:
  - 1. Field measurements indicate that any of the “threshold” movement criteria are reached or exceeded.
  - 2. Field measurements or observations indicate that significant or sustained wall movements are occurring (total movement may be less than the “Limiting” movement criteria).
  - 3. Movements of adjacent structures, utilities or other facilities are detected.
- C. If “Limiting” movements are being approached or reached, the Engineer, based on his judgment and review of the movement monitoring data, may require the Contractor to temporarily terminate the work in the area where such movement is occurring and implement all necessary mitigation measures which are satisfactory to the Engineer, to arrest the movements, at no cost to the Owner.
- D. Horizontal or vertical movement of any point on adjacent structures shall not exceed 0.5 inches. The Contractor shall establish and monitor survey points on the adjacent structures. The Contractor shall take all necessary measures to prevent greater settlements, at no additional cost to the Owner.
- E. These criteria are intended to establish a minimum basis for the Contractor’s design and procedures and in no way relieve the Contractor of his sole responsibility for preventing detrimental movements and damage to adjacent structures, utilities or other work.
- F. Monitoring personnel shall use a procedure for reading and recording geotechnical instrumentation data which compares the current reading to the last reading during data collection to eliminate spurious readings.
- G. Plot the observed ground deformation readings versus time. Annotate the plots with construction loading and excavation events having an impact on the readings. Evaluate plots by means of secondary rate-of-change plots to provide early warning of accelerating ground movements.
- H. Implement Construction Contingency Plan under direction of the temporary excavation support system designer, installation supervisor and the Engineer.

### 3.3 REMOVAL OF EARTH RETENTION SYSTEM

- A. Sheeting shall not be left in place unless otherwise indicated or approved in writing by the Engineer.

- B. When indicated or approved by the Engineer, remove the temporary excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of temporary excavation support systems with bank-run gravel, screened gravel or select borrow by tamping with tools specifically adapted for that purpose.
- C. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the work.
- D. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.
- E. Conduct survey of the locations and final cut-off elevations of the excavation support systems left in place.
- F. Submit as-built information, prior to backfilling.

#### 3.4 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

## SECTION 02200

### EARTHWORK

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. This Section includes excavations of normal depth in earth for trenches and structures; backfilling such excavations to the extent required; filling; rough grading; cofferdamming; constructing embankments; miscellaneous earth excavation; temporary excavation support; the removal, hauling and stockpiling of suitable excavated material for subsequent use in the work; all rehandling, hauling and placing of stockpiled materials for use in refilling, filling, backfilling, grading and such other operations; the removal and satisfactory disposal off the site of unsuitable material; compaction; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.
- B. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section. Related Sections include the following:
  - 1. Section 02140 - Dewatering and Discharge.

##### 1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Backfill Materials: If requested by the Engineer, submit a grain size analysis and curve performed in accordance with ASTM D422 for each proposed source of backfill for review by the Engineer. The grain size analysis shall indicate that the backfill material conforms to the gradation requirements specified.
- C. If requested by the Engineer, submit a grain size analysis and a constant head permeability result in accordance with ASTM D422 and ASTM D2434 respectively for each proposed source of the drainage sand for review by the Engineer.
- D. If requested by the Engineer, submit a controlled density fill (CDF) mix design showing the proportions and gradations of all materials.
- E. If requested by the Engineer, submit a moisture-density curve indicating the maximum dry-density and optimum moisture content as determined by ASTM D1557 for each proposed source of backfill for review by the Engineer.
- F. Submit the qualifications of the independent geotechnical testing laboratory performing soil testing and inspection services during earthwork operations. The

geotechnical testing laboratory must demonstrate to the Engineer's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM D3740, that it has the experience and capability to conduct required field and laboratory geotechnical testing. In addition, the laboratory shall be supervised by a Registered Professional Engineer in the State of Rhode Island.

- G. Submit an excavation, backfilling, and filling plan at least one week prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include, but not be limited to the following items:
1. Detailed sequence of work.
  2. General description of construction methods.
  3. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.
  4. Details of dust control measures.
  5. Proposed locations of stockpiled excavation and/or backfill materials.
  6. Proposed surplus excavated material off-site disposal areas and required permits.

### 1.3 EXCAVATION CLASSIFICATIONS

- A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for exploratory excavation, unauthorized excavation, additional excavation, or rock excavation.
- B. Exploratory Excavation, also referred to as test pits, shall consist of the removal of materials for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work. Exploratory excavation shall be performed as shown on the plans and as directed by the Engineer. Exploratory excavation not directed or approved by the Engineer shall be at the Contractor's expense.
- C. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.



D. Additional Excavation:

1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions.
2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Engineer.
3. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work or as provided for under the unit rates for this classification.

E. Rock Excavation:

1. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42-inch wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90HP flywheel power and 30,000 lb. drawbar pull. Trenches in excess of 10 foot 0-inches in width and pits in excess of 30 feet 0-inches in either length or width are classified as open excavation.
2. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modern track-mounted heavy-duty excavating equipment without drilling, blasting or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170HP flywheel power and developing 40,000 lb. break-out force (measured in accordance with SAE J732C).
3. Determination of rock excavation classification will be made by the Engineer. Typical of materials classified as rock are boulders 1.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent drilling, blasting or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Engineer. If the area to be excavated is preblasted prior to the excavation of overburden soils, the Engineer shall be notified at least two days in advance to allow observation of the preblast drilling by the Engineer in order to classify the excavation. Visual observation of the completed excavation may be made by the Engineer to modify the excavation classifications. Removal of rock excavation prior to classification by the Engineer shall be considered as earth excavation unless accepted by the Engineer in writing. Such excavation will be paid on the basis of contract unit rates for this classification.

4. Rock payment lines are limited to the following:
  - a. Two feet outside of concrete work for which forms are required, except footings.
  - b. One foot outside perimeter of footings.
  - c. In pipe trenches, depth limits shall be 6-inches below bottom of pipe with a minimum payment depth of 3 feet of rock excavated with blasting and a minimum payment depth of 6-inches of rock excavated with power tools or by mechanical means. Width payments limits shall be according to the following table:

Depth From Ground <u>Surface to Invert of Pipe</u>	Pay Width (Pipe I.D.)	
	0 - 24"	over 24"
0 to 12'	5'- 0"	Pipe I.D. +3'-0"
12' to 20'	7'- 0"	Pipe I.D. +5'-0"
Over 20'	9'- 0"	Pipe I.D. +7'-0"

- d. Rock sloping across the width of trench shall have the top of rock established at the rock elevation over the centerline of the pipe.
- e. Rock excavation within the limits of tunneling or which are included under other items of work will not be considered as rock excavation.

#### 1.4 EXCAVATION

- A. The Contractor shall perform all excavations of every description and of whatever substances encountered, in a manner as required to allow for placing of temporary earth support, forms, installation of pipe and other work, and to permit access to the Engineer for the purpose of observing the work. Excavations shall be to such widths as will give suitable space for the required work. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work; work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.
- B. All excavations made in open cut will be controlled by the conditions existing at the various locations and shall always be confined to the limits as designated by the Engineer. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and pipelines as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth faced bucket or by hand if directed by the Engineer.
- C. The Contractor shall satisfy all dewatering requirements specified in Section 02140 – Dewatering before performing trench excavations.

#### 1.5 TEMPORARY EARTH SUPPORT

- A. The Contractor shall furnish, place and maintain such sheeting, shoring, and bracing at locations necessary to support the sides of excavations and to prevent danger to persons or damage to pavements, facilities, utilities, or structures, and to prevent injurious caving or erosion or the loss of ground, and to maintain pedestrian and vehicular traffic as directed and required.
- B. In all sheeting, shoring and bracing operations, care shall be taken to prevent injury to persons or damage to structures, facilities, utilities and services. Any injuries to persons shall be the responsibility of the Contractor; and any damage to the work occurring as a result of settlement, water or earth pressure, or other causes due to inadequate bracing or other construction operations of the Contractor shall be satisfactorily repaired or made good by the Contractor, at no additional expense to the Owner.
- C. Where sheeting is to be used, it shall be driven ahead of excavation operations to the extent practicable so as to avoid the loss of material from behind the sheeting; where voids occur outside of the sheeting, they shall be filled immediately with selected fill, thoroughly compacted.
- D. The Contractor shall leave in place all sheeting and bracing at the locations and within the limits ordered by the Engineer in writing. The Contractor shall cut off the sheeting at elevations to be determined by the Engineer.
- E. Conform to the requirements of the OSHA Standards and Interpretations: “Part 1926 Subpart P-Excavation, Trenching, and Shoring”.
- F. The Contractor shall comply with all federal, state, and local safety regulations, and requirements.

## PART 2 – PRODUCTS

### 2.1 BACKFILL MATERIALS

- A. Common Fill: Common fill shall be soil containing no stone greater than 2/3 loose lift thickness. The materials shall be free of trash, ice, snow, tree stumps, roots and other organic and deleterious materials. Common fill shall not contain more than 35 percent by weight of silt and clay. It shall be of such a nature and character that it can be compacted to the specified densities in a reasonable length of time. Topsoil and subsoil shall not be considered common fill.
- B. Structural Fill: Structural fill shall consist of gravel and sand consisting of hard durable particles, and free from trash, ice and snow, tree stumps, roots and other organic and deleterious or organic matter. Structural fill shall conform to the following gradation requirements.

Sieve Size	Percent Finer by Weight
8-inch	100 (1)
3-inch	70-100
1-inch	45-90
No. 4	20-70
No. 10	15-60
No. 40	10-40
No. 200	0-10
<u>(1) Four-inch maximum particle size within 12 inches of slab, footing or pavement grade.</u>	

- C. Sand and Gravel: Sand and gravel fill shall consist of hard, durable sand and gravel, and shall be free from ice and snow, roots, sod, rubbish, and other deleterious or organic matter. It shall conform to the following gradation requirements.

Sieve Size	Percent Finer by Weight
(a)	100
1/2-inch	50-85
No. 4	40-75
No. 10	---
No. 40	10-35
No. 100	(b)
No. 200	0-8
Notes:	
(a) Maximum grain size shall be four (4)-inches where placed as base below slab and pavement; elsewhere 2/3 of the loose lift thickness.	
(b) The amount passing the No. 100 sieve should be between 40 percent and 70 percent of the amount passing the No. 40 sieve.	

- D. Crushed Stone: Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the following requirements.

Sieve Size	Percent Passing by Weight	
	3/4-inch Stone*	1/2-inch Stone
1-inch	75-100	---
3/4-inch	0-5	---
5/8-inch	---	100
1/2-inch	---	85-100

Percent Passing by Weight		
Sieve Size	3/4-inch Stone*	1/2-inch Stone
3/8-inch	---	15-45
No. 4	---	0-15
No. 8	---	0-5

\*Stone shall be washed

- E. Coarse sand: sand material shall meet the geotechnical testing requirements specified herein. The sand shall be washed and consist of clean inert, hard, durable grains of quartz or other hard durable rock, free from clay, organics, surface coatings or other deleterious material. Coarse Sand shall have a minimum permeability of  $1 \times 10^{-3}$  cm/sec and shall conform to the following gradation:

Sieve Size	Percent Passing by Weight
1/2-inch	100
3/8-inch	85-100
No. 4	0-20
No. 16	0-5
No. 100	0-2

- F. Stone riprap used where indicated shall conform to the following gradation:

SIZE OF STONE (IN)	MAXIMUM PERCENT OF TOTAL WEIGHT SMALLER THAN GIVEN WEIGHT
8	95-100
4	0-25
2 1/2	0-5

- G. Processed Gravel for Subbase: Processed gravel for subbase shall be used where specified and shall consist of inert material that is hard, durable stone and coarse sand free from frost, frozen lumps, loam and clay, surface coatings, and deleterious materials.

Gradation requirements for Processed gravel for subbase shall conform to the following:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
3 inch	100
1 ½"	70-100
¼"	50-85
No. 4	30-60
No. 200	0-10

- H. Dense graded crushed stone: Dense graded crushed stone shall be used where specified and shall consist of Coarse aggregate shall consist of hard, durable particles of fragments of stone. Materials that break up when alternately frozen and thawed or wetted and dried shall not be used. Coarse aggregate shall have a percentage of wear, by the Los Angeles test, of not more than 45. Fine aggregate shall consist of natural or crushed sand. The composite material shall be free from clay, loam or other plastic material, and shall conform to the following grading requirements:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
2 inch	100
1 ½"	70-100
¾"	50-85
No. 4	30-55
No. 50	8-24
No. 200	3-10

- I. Controlled Density Fill (CDF) material is flowable, self-consolidating, rigid setting, low density material that substitute for compacted gravel for backfills, fills, structural fills, and pipe abandonment. There are two main categories for CDF's, excavatable and non-excavatable with a subcategory of flowable and very flowable. It shall be a mixture of Portland cement, flyash, sand and water designed to provide strengths within the range specified. Type 2E flowable (excavatable) fill shall be used.

The categories of CDF's are:

Type 1	Very Flowable (Non-Excavatable)
Type 1E	Very Flowable (Excavatable)
Type 2	Flowable (Non Excavatable)
Type 2E	Flowable (Excavatable)

- J. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the following limits when tested in accordance with ASTM C 136:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
1 inch	100
No. 4	10-30
No. 8	0-10
No. 16	0-5

## 2.2 DUST CONTROL

- A. Water application shall be the only mean for dust control.

## PART 3 – EXECUTION

### 3.1 FILLING AND BACKFILLING

- A. **Subgrade Preparation:** After the subgrade has been shaped to line, grade, and cross-section, it shall be thoroughly compacted. This operation shall include any required reshaping and wetting to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.
- B. **Backfill Material Selection:** Unless otherwise specified or directed, material used for filling and backfilling shall meet the requirements specified under Materials (Part 2). In general, the material used for backfilling utility trench excavations shall be material removed from the excavations provided that the reuse of these materials result in the required trench compaction and meets the requirements specified for common fill. All backfill placed within the building limits shall be structural fill unless otherwise specified. In areas where the bottom of the excavation is in fine sand and silt, and is below the groundwater table, the first lift of backfill shall be 12-inches of compacted sand and gravel to provide a working mat and drainage layer.

Place backfill to a maximum loose lift thickness of 12 inches. Maintain backfill material with a uniform moisture content, with no visible wet or dry streaking, between plus 2 percent and minus 3 percent of optimum moisture content. The final filled soil mass shall be as uniform as possible in lift thickness, moisture content, and effort required to compact soil mass.

- C. **Trench Backfill:**

1. The trenches shall be backfilled as soon as practicable with suitable material. All trench backfilling shall be done with special care, in the following manner and as directed by the Engineer.
2. Backfill material for pipe bedding shall be deposited in the trench, uniformly on both sides of the pipe, for the entire width of the trench to the springline of the pipe. The selected backfill material shall be placed by hand shovels, in layers not more than 4-inches thick in loose depth, and each layer shall be thoroughly and evenly compacted by tamping on each side of the pipe to provide uniform support around the pipe, free from voids.
3. The balance of backfill shall be spread in layers not exceeding 12-inches in loose depth. Each layer shall be thoroughly compacted by mechanical methods and shall contain no rock, stones or boulders larger than 4-inches in their greatest dimension.
4. All trench backfilling shall be done with special care and must be carefully placed so as not to disturb the work at any time; if necessary, a timber grillage or other suitable method shall be used to break the fall of material. The moisture content of the backfill material shall be such that proper compaction will be obtained. Puddling of backfill with water will not be permitted. Backfill within areas to receive topsoil or pavement construction shall be made to grades required to establish the proper subgrade for the placement of topsoil or pavement base courses.
5. In backfilling trenches, each layer of backfill material shall be moistened and compacted to a density at least equal to that of the surrounding undisturbed earth, and in such a manner as to permit the rolling and compaction of the filled trench or excavation with the adjoining earth to provide the required bearing value, so that paving of the excavated and disturbed areas, where required, can proceed immediately after backfilling is completed.
6. Any trenches or excavations improperly backfilled or where settlement occurs shall be reopened, to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and condition, at no additional expense to the Owner.
7. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. If the observation of the pipelines shows poor alignment, displaced pipe or any other defects they shall be remedied in a manner satisfactory to the Engineer at no additional cost to the Owner.

D. Backfilling Against Structures:

1. Backfilling against masonry or concrete shall not be done until permitted by the Engineer. The Contractor shall not place backfill against or on structures



until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been satisfactorily completed, special leakage tests of the structures shall be made by the Contractor, as required by the Engineer. After the satisfactory completion of leakage tests and the satisfactory completion of any other required work in connection with the structures, the backfilling around the structures shall proceed using suitable and approved excavation material. The best of the backfill material shall be used for backfilling within 2 feet of the structure. Just prior to placing backfill, the areas shall be cleaned of all excess construction material and debris and the bottom of excavations shall be in a thoroughly compacted condition.

2. Symmetrical backfill loading shall be maintained. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures. During backfilling operations, care shall be exercised that the equipment used will not overload the structures in passing over and compacting these fills. Except as otherwise specified or directed, backfill shall be placed in layers not more than 12-inches in loose depth and each layer of backfill shall be compacted thoroughly and evenly using approved types of mechanical equipment. Each pass of the equipment shall cover the entire area of each layer of backfill.
  3. In compacting and other operations, the Contractor shall conduct his operations in a manner to prevent damage to structures due to passage of heavy equipment over, or adjacent to, structures, and any damage thereto shall be made good by the Contractor at no additional expense to the Owner.
- E. After backfilling trenches and excavations, the Contractor shall maintain the surfaces of backfill areas in good condition so as to present a smooth surface at all times level with adjacent surfaces. Any subsequent settling over backfilled areas shall be repaired by the Contractor immediately, in a manner satisfactory to the Engineer, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.
- F. The finished subgrade of the fills and filled excavations upon which topsoil is to be placed, or pavements are to be constructed, shall not be disturbed by traffic of other operations and shall be maintained in a satisfactory condition until the finished courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.
- G. Uniformly smooth grading of all areas to be graded, as indicated and as directed, including excavated and filled sections, embankments and adjacent transition areas, and all areas disturbed as a result of the Contractor's operations, shall be accomplished. The finished surfaces shall be reasonably smooth, compacted and free from surface irregularities.

### 3.2 COMPACTION

- A. Compaction Requirements: The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

Area	ASTM Density Degree of Compaction
Below footings	95%
Below slabs	95%
Against concrete structures	95%
Pavement base course	95%
Pavement subbase	95%
General fill below pavement subbase	95%
Trench backfill - below pavements	95%
- below landscaped areas	90%
- below structures	95%
Other areas	90%

- B. Moisture Control:

1. Fill that is too wet for proper compaction shall be disced, harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.
2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

- C. Unfavorable Conditions:

1. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
2. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

- D. Compaction Control:

1. In-place density tests shall be made in accordance with ASTM D1556, D2922 or D2167 as the work progresses, to determine the degree of compaction

being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. In-place density tests will be made at the Contractor's expense by the geotechnical testing laboratory.

2. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing performed by him shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.
3. In-place density tests shall be performed as a minimum according to the following:
  - a. One test per lift under spread footings.
  - b. One test per lift for every 100' length of strip footings.
  - c. A minimum of every 50 cubic yards of backfill in trenches or around structures.
  - d. One test every 500 cubic yards of material placed for embankment construction.
4. Minimum testing requirements for granular drainage and backfill material placed over the impervious cover material or liner are as follows:

Type of Test	Frequency	Testing Method(s)
Grain Size Analysis (to the No. 200 Sieve)	1 test/1500 cy	ASTM D-422
Permeability **	One test/3000 cy	ASTM D-2434
Proctor Compaction Test	One test/source	ASTM D-1557

*Note: \*\* - Permeability testing is only required for specified "sand" drainage layer or impermeable soil materials.*

E. Placement:

1. All fill shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill should be benched into the existing slope in order to avoid the formation of a shear plane.

### 3.3 FINE GRADING

- A. Before surface or subbase is spread, the subgrade shall be shaped to a true surface conforming to the Drawings. All depressions and high spots shall be filled with suitable material or removed and such areas again compacted until the surface is smooth and properly compacted. A tolerance of 1/2-inch above or below the finished subgrade will be allowed provided that this 1/2-inch above or below grade is not maintained for a distance longer than 50 feet and that the required crown is maintained in the subgrade. Any portion which is not accessible to a roller shall be thoroughly compacted by other mechanical methods.

### 3.4 STOCKPILING AND USE OF SURPLUS EXCAVATED MATERIALS

- A. The Contractor shall strip and stockpile excavated materials. Any bushes that are removed shall be protected and replanted in the same location. Removed curbing shall be stockpiled in a safe manner. Where grassed areas are disturbed by stockpiled materials, the Contractor shall rake out the area and loam and re-seed at his expense.
- B. Stockpiling of materials shall be included in the pay items for excavating and no allowances shall be made for any stripping and stockpiling requirements.
- C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor. When required, it shall be re-handled and used in backfilling the trench.
- D. Use of surplus excavated materials (not including pavement or asphaltic concrete) as back-fill material is permitted if surplus material meets requirements of backfill materials as specified above. All other surplus material shall be taken off-site and disposed of legally at the Contractor's expense.
- E. Testing of surplus excavated materials shall be provided as described in 1.2B to confirm compliance with specifications. Submit test results to Engineer one week prior to backfill operations.

### 3.5 EXCAVATION SUPPORT SYSTEM

- A. Furnish, put in place and maintain sheeting and bracing required by Federal, State or local safety requirements to support the sides of the excavation and prevent loss of ground which could endanger personnel, damage or delay the work or endanger adjacent structures. If the Engineer is of the opinion that at any point sufficient or

proper supports have not been provided, he/she may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his/her responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

- B. When moveable trench bracing such as trench boxes, manhole boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill.
- C. When installing pipe; trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, screened gravel shall be placed to fill any voids created and the screened gravel and backfill shall be recompact to provide uniform side support for the pipe.
- D. The Contractor will be permitted to use steel sheeting in lieu of wood sheeting for the entire job wherever the use of sheeting is necessary. The cost for use of sheeting will be included in the bid items for pipe and shall include full compensation for driving, bracing and later removal of sheeting.
- E. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction of other structures, utilities, or property, whether public or private. All voids left after withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as directed.
- F. The Contractor shall receive no payment, for sheeting, bracing, etc., during the progress of the work. The Contractor shall receive no payment for sheeting which has actually been left in the trench for the convenience of the Contractor.
- G. Sheeting driven below mid-diameter of any pipe shall remain in place from the driven elevation to at least 1-ft above the top of the pipe.

### 3.6 DUST CONTROL

- A. Calcium chloride application will not be permitted unless it is approved by the Engineer
- B. Water application shall be the only method used for dust control. Application shall be by means of a water truck or other approved method. The number and frequency of applications shall be determined by the Engineer.

END OF SECTION



## SECTION 02273

### GEOTEXTILE FABRIC

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This section includes the following:
1. Providing geotextile fabric in foundation preparation for separation of existing soil from screened gravel or crushed stone beneath structures.
  2. Placing the geotextile fabric as temporary road reinforcement and riprap separation at pipe outlets, swales, and slopes, and as otherwise indicated or specified.
  3. Providing geotextile fabric for silt fence as indicated or specified.

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section, and.
1. Section 02140 – Dewatering and Discharge
  2. Section 02020 – Erosion and Sediment Control
  3. Section 02200 – Earthwork

##### 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:
1. At least two weeks prior to shipment, submit manufacturer's certificate of compliance and physical property data sheet indicating that requirements for materials and manufacture are in conformance as specified.
  2. For informational purposes only, submit manufacturer's printed installation instructions.

##### 1.4 QUALITY ASSURANCE

- A. General:
1. Producer of geotextile fabric to maintain competent laboratory at point of manufacture to insure quality control in accordance with ASTM testing procedures. Laboratory to maintain records of quality control results.

2. Do not expose geotextile fabric, except the geotextile fabric for silt fence, to ultraviolet radiation (sunlight) for more than 14 days total in period of time following manufacture until geotextile fabric is installed and covered with fill or backfill material.
3. Take all precautions to protect geotextile fabric from damage resulting from any cause. Either repair or replace geotextile fabric to Engineer's satisfaction at no additional cost to the Owner.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with manufacturer's recommendations.
- B. Provide geotextile fabric in rolls wrapped with protective covering to protect geotextile fabric from mud, dirt, dust, and debris. Label each roll of geotextile fabric with number or symbol to identify production run.
- C. Protect geotextile fabric from sunlight during transportation and storage. Do not leave geotextile fabric exposed to sunlight for more than two weeks during installation operations.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Provide the following nonwoven (4.5 ounce per square yard) geotextile fabric, Model # US 120NW as manufactured by US Fabrics or approved equal.
- B. Provide the following woven geotextile fabric for silt fence (if required):
  1. Amoco 2122 as manufactured by Amoco Fabrics and Fibers Co., Atlanta, GA.
  2. Mirafi 100X as manufactured by Mirafi, Pendergrass, GA.
  3. Geotex 910SC as manufactured by Synthetic Industry, Chattanooga, TN.
  4. Or acceptable equivalent product.

#### 2.2 MATERIAL

- A. Geotextile fabric shall conform to test requirements for minimum average roll value (weakest principle direction) for strength properties of any individual roll tested from manufacturing lot or lots of particular shipment in excess of minimum average roll value (weakest principle direction) as specified hereafter:
- B. Physical Properties of Minimum Average Roll of the 4.5-ounce per square yard nonwoven geotextile fabric shall be:



	Property	ASTM Test Method	Units	Value
1.	Tensile Strength	D4632	lbs	120
2.	Elongation at Break	D4632	%	50
3.	Trapezoidal Tear Strength	D4533	lbs	50
4.	Puncture Strength	D4833	lbs	70
5.	Permittivity	D4491	Sec <sup>-1</sup>	1.5
6.	Apparent Opening Size	D4751	Sieve #	70
7.	Mullen Burst Strength	D3786	Psi	230
8.	UV Resistance %Retained	D4355	%	70
9.	Flow Rate	D4491	Gal/mins/sf	120

- C. Physical Properties of Minimum Average Roll of the woven geotextile fabric for silt fence shall be:

	Property	ASTM Test Method	Units	Value
1.	Grab Strength	D4632	lbs	100
2.	Permittivity	D4491	sec - 1	0.10
3.	Apparent Opening Size	D4751	Sieve #	20-30
4.	Ultraviolet Stability	D4355	%	70

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install geotextile fabric in accordance with manufacturer's printed instructions.
- B. Place geotextile fabric on the foundation subgrade prior to placing the screened gravel or crushed stone.
- C. Overlap geotextile fabric 18 inches minimum for unsewn lap joint.
- D. Do not permit traffic or construction equipment to travel directly on geotextile fabric.
- E. Place geotextile fabric in relatively smooth condition to prevent tearing or puncturing. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.
- F. Patch all tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of 3 feet overlay.

- G. Extend the geotextile fabric and wrap around the screened gravel or crushed stone along the perimeter of the foundation.

### 3.2 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

## SECTION 02570

### PROCESS WATER HANDLING SYSTEM

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section specifies requirements for the proposed sewer force main and sewer gravity lines and manhole structures and associated items.
- B. The work includes furnishing and installing sewer pipes, fittings, manholes, and other structures and appurtenances required and in accordance with the Drawings and Specifications.

##### 1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, and:
  - 1. Section 02200 – Earthwork
  - 2. Section 02160 – Temporary Excavation Support System
  - 3. Section 02140 – Dewatering and Discharge

##### 1.3 SUBMITTALS

- A. List of materials proposed and manufacturers specifications and installation instructions.
- B. Shop drawings for all material and structures prior to ordering materials, including pipe materials, connections, fittings and valves, precast concrete sewer manholes and frames and covers, and component construction, features, configuration, and dimensions.

##### 1.4 INSPECTION

- A. The supplier is responsible for the provisions and all test requirements specified in ASTM D2241 for PVC pressure rated sewer pipe. In addition, all PVC pipe may be inspected at the plant for compliance with these specifications by an independent testing laboratory selected and paid for by the Owner. The Contractor shall require the manufacturer's cooperation in these inspections.
- B. Inspection of the pipe may also be made after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though pipe samples may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the site at once.

- C. Imperfections in materials may be repaired, subject to approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval.

## 1.5 DELIVERY, STORAGE & HANDLING

- A. All materials shall be adequately protected from damage during transit. Pipes shall not be dropped.
- B. All pipe and other appurtenances shall be inspected before placement in the work and any found to be defective from any cause, including damage caused by handling, and determined by the Engineer to be unrepairable, shall be replaced at no cost to the Owner.
- C. Storage and handling of pipes, manholes and other sewer system appurtenances shall be in accordance with the manufacturer's recommendations, subject to the approval of the Engineer.

## PART 2 - PRODUCTS

### 2.1 POLYVINYLCHLORIDE (PVC) PIPE

- A. Gravity Pipe and Fittings: Gravity pipe shall be Schedule 40 PVC with rubber rings.
- B. Pressure Pipe and Fittings: Polyvinylchloride (PVC) pressure pipe and fitting shall conform to ASTM 2241 for 160 psi pipe (SDR 26).
- C. Joints: Rubber rings shall conform to ASTM F477 and joints shall be design tested to the requirements of ASTM D3139.

### 2.2 MANHOLES

- A. Precast Units:
  1. Structure: Four foot (4') minimum inside diameter precast units (4,000 psi minimum compressive strength) with eccentric cone section tapering to twenty-four inch (24") diameter (minimum), or flat top as required, and one pour monolithic base section conforming to ASTM C478. All units shall be designed for HS-20 loading. Flat tops shall be used where manholes are less than eight feet (8') deep.
  2. Precast Unit Joint Seals: Butyl rubber O-ring type seal conforming to ASTM C990.
  3. The date of manufacture, trademark and name of the manufacturer shall be clearly marked on the inside of each precast section.
  4. Units shall have 2 coats of factory applied bitumastic water proofing on the exterior.

- B. Masonry:
1. Brick for construction of inverts and adjusting manholes to grade shall be Grade SS conforming to ASTM C32.
  2. Mortar shall be in conformance with ASTM C270, Type M. The mortar shall be composed of Portland Cement hydrated lime, and sand, in the proportions of 1 part cement to ¼ part hydrated lime to 3-1/2 parts sand, by volume.
  3. Cement shall be Type I or II Portland cement conforming to ASTM C150, Standard Specification for Portland Cement. Where masonry is exposed to salt water, Type II shall be used.
  4. Hydrated lime shall be Type S conforming to ASTM D207.
  5. Sand for masonry mortar shall conform to the gradation requirements of ASTM C144.
- C. Manhole Frame and Cover: Provide heavy duty cast iron frame and cover, with the word “SEWER” embossed on cover. Letter size shall be three inches. Frame and cover shall be manufactured by LeBaron LT 102 only (no substitutes will be accepted).
- D. Pipe Connections: Flexible sleeve or rubber gaskets shall be Lock Joint, Kor-N-Seal, A-Lok or approved equal.
- E. Bitumastic Coating: The entire exterior surface of all manholes shall be coated with two coats of an approved bitumastic material to produce a dry film thickness of 0.07 inches (7 mils) per coat.
- F. Rungs: Manhole rungs shall be steel reinforced copolymer polypropylene plastic. Rungs shall be 14 inches wide. Copolymer polypropylene shall be Type II, grade 16906 meeting ASTM specifications D2146. Steel reinforcing shall be 3/8-inch diameter, grade 60 conforming to ASTM Specification A615 and shall be continuous throughout the rung. The portion of the legs to be embedded in the precast section shall have fins and be tapered to ensure a secure bond.

## PART 3 - EXECUTION

### 3.1 EXCAVATION AND BACKFILLING

- A. The type of materials to be used in bedding and backfilling and the method of placement shall conform to the requirements of Section 02200– Earthwork, and the details shown on the Drawings.

### 3.2 PIPE INSTALLATION

- A. All sewer piping shall be laid accurately to the lines and grades shown in the Drawings and in conformance with pipe manufacturer’s recommended procedures.

- B. Laying Pipe: Each length of pipe shall be laid with firm, full and even bearing throughout its entire length, in a prepared trench. Pipe shall be laid with bells upgrade unless otherwise approved by the Engineer.

Every length of pipe shall be inspected and cleaned of all dirt and debris before being laid. The interior of the pipe and the jointing seal shall be free from sand, dirt and trash. Extreme care shall be taken to keep the bells of the pipe free from dirt and rocks so that joints may be properly lubricated and assembled.

No length of pipe shall be laid until the preceding lengths of pipe have been thoroughly embedded in place, to prevent movement or disturbance of the pipe alignment.

- C. Pipe Extension: Where an existing pipe is to be extended, the same type of pipe shall be used, unless otherwise approved by the Engineer.

- D. Full Lengths of Pipe: Only full lengths of pipe shall be used in the installation except that partial lengths of pipe may be used at the entrance to structures, and to accommodate the required locations of service connection fittings.

- E. Pipe Entrances to Structures: All pipes entering structures shall be cut flush with the inside face of the structure, and the cut ends of the pipe surface within the structure shall be properly rounded and finished so that there will be no protrusion, ragged edges or imperfections that will impede or affect the hydraulic characteristics or the sewage flow. The method of cutting and finishing shall be subject to the approval of the Engineer.

- F. Protection During Construction: The Contractor shall protect the installation at all times during construction, and movement of construction equipment. Vehicles and loads over and adjacent to any pipe shall be performed at the Contractor's risk and in accordance with all applicable federal, state and local safety regulations.

At all times when pipe laying is not in progress, all open ends of pipes shall be closed by approved temporary water-tight plugs. If water is in the trench when work is resumed, the plug shall not be removed until the trench has been properly dewatered and all danger of water entering the pipe eliminated. The Contractor is responsible for proper dewatering to ensure a stable pipe foundation. Proper dewatering to two feet (minimum) below the pipe invert to ensure joining of the pipe in a dry condition.

- G. Water Pipe – Sewer Pipe Separation: When a sewer pipe crosses above or below a water pipe, the following procedures shall be utilized. The Contractor shall comply with these following procedures.

1. Relation to Water Mains

- a. Horizontal Separation: Whenever possible sewers shall be laid at a minimum at least ten feet (10'), horizontally, from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet to a water main if:

- i. It is laid in a separate trench, or if
  - ii. It is laid in the same trench with the water mains located at one side on a bench of undistributed earth, and if
  - iii. In either case the elevation of the top (crown) of the sewer is at least 18 inches below the bottom (invert) of the water main.
- b. Vertical Separation: Whenever sewers must cross under water, sewer is at least eighteen inches (18") below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint pipe for a distance of ten feet (10') on each side of the sewer. One full length of water main should be centered over the sewer so that both joints will be as far from the sewer as possible.
- c. When it is impossible to obtain horizontal and/or vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical-joint cement lined ductile iron pipe or other equivalent based on water tightness and structural soundness. Both pipes shall be pressure tested by an approved method to assure water tightness or both pipes shall be encased in concrete.

### 3.3 PVC PIPE JOINTS

- A. All joints shall be made watertight.
- B. Pipe shall be jointed in strict accordance with the pipe manufacturer's instruction. Jointing of all pipes shall be done entirely in the trench.
- C. PVC Pipe
  - 1. Lubricant for jointing of PVC pipe shall be applied as specified by the pipe manufacturer. Use only lubricant supplied by the supplied by the pipe manufacturer.
  - 2. PVC pipe shall be pushed home by hand or with use of a bar and block. The use of power equipment, such as a backhoe bucket, shall only be used at the direction of the manufacturer.
  - 3. Field-cut pipe ends shall be cut square and the pipe surface beveled to the size and shape of a factory-finished beveled end. All sharp edges shall be rounded off.

### 3.4 MANHOLES

- A. General Requirements: All manholes shall be built in accordance with the Details and in the locations shown on the Drawings. Structures shall be constructed of precast concrete. Personnel experienced and skilled in this work shall install all masonry, and any person not deemed to be such by the Engineer shall be removed and replaced by a person so qualified. Manholes shall be constructed as soon as the

pipe laying reaches the location of the manhole. Should the Contractor continue laying pipe without making provisions for completion of the manhole, the Engineer shall have the authority to stop the pipe laying operations until the manhole is completed. The Contractor shall accurately locate each manhole and set accurate templates to conform to the required line and grade. Any manhole that is incorrectly located or oriented improperly shall be removed and rebuilt in its proper location, alignment and orientation at no additional cost to the Owner.

- B. Foundations: All manholes shall be constructed on a 12 inch layer of crushed stone with filter fabric bedding material. The excavation shall be dewatered to provide a dry condition while placing bedding material and setting the base.
- D. Inverts: Brick invert channels shall be constructed in all manholes to provide a smooth channel for sewage flow through the structure, and shall correspond in shape to the lower half of the pipe and extended vertically to the pipe crown. At changes in directions, the inverts shall be laid out in curves of the longest possible radii tangent to the centerline of the sewer pipes at the manhole side. Shelves shall be constructed to the elevation of the highest pipe crown and sloped to drain toward the flow channel at one inch per foot (1"/foot).

Special care shall be taken in laying brick inverts. Joints shall not exceed three-sixteenth inch in thickness and each brick shall be carefully laid in full cement mortar joint on bottom, side and end in one operation. No grouting or working in of mortar after laying of the brick will be permitted. Bricks forming the shaped inverts in manholes shall be laid on edge.

Invert channels shall be built for future extensions where shown on the Drawings and where directed by the Engineer.

- E. Precast Manholes: Precast manholes shall be installed only after Shop Drawings have been approved. The top grade of the precast concrete cone section shall be set sufficiently below finished grade to permit a maximum of five and a minimum of two courses of eight inch brick to be used as risers to adjust the grade of the manhole frame. Manhole frames shall be set on a grout pad to make a watertight fit.

### 3.5 CONNECTIONS TO EXISTING FACILITIES

- A. General Requirements: The Contractor shall make all required connections of the proposed sewer into existing sewer system, where and as shown on the Drawings and as required by the Engineer.
- B. Compliance with Requirements of Owner of Facility: Connections into existing sewer facilities shall be performed in accordance with the requirements of the Owner of the facility. The Contractor shall comply with all such requirements, including securing of all required permits, paying the costs thereof, and providing twenty-four (24) hour notice prior to beginning the work.



### 3.6 PIPE CONNECTIONS TO NEW STRUCTURES

- A. Pipe connections for precast structures may be accomplished by the method described below. The Contractor shall make sure that the outside diameter of the pipe is compatible with the particular pipe connection used.
  - 1. KOR-N-SEAL (or approved equal) neoprene boot cast into the manhole wall. The stainless steel clamp shall be protected from corrosion with a bitumastic coating.
- B. Sewer manholes shall be constructed with interior drop connections when the proposed invert of the connection is at least two feet nine inches (2'-9") above the manhole invert. Drop connections for differences of less than two feet nine inches (2'-9") shall also be provided if approved by the Engineer.
- C. Each manhole pipe connection shall begin with a five-foot (5') stub prior to laying a full section of pipe. Pipe stubs for future connections shall be installed in the locations shown on the drawings and the stub ends shall be sealed with a watertight plug.

### 3.7 PRESSURE TESTING OF SEWER FORCE MAIN

- A. Hydrostatic and leakage test shall be conducted in accordance with AWWA Standard C600, and as directed by the Engineer. Testing shall be conducted by a certified independent water testing company.
- B. Conduct pipe tests after concrete thrust blocks have cured to the required 3000 psi strength. Fill pipe 24 hours prior to testing, and apply test pressure to stabilize system. Use only potable water.
- C. Prior to pressure testing, the entire pipe section shall be flushed to remove any rocks or debris, which may have inadvertently entered the pipe during construction.
- D. Once the pipe section has been filled at normal pressure and all entrapped air removed, the Contractor shall raise the pressure to 150 psi or two times the operation pressure (whichever is greater) by a special pressure pump, taking water from a small tank of proper dimensions for satisfactorily measuring the rate of pumpage into the pipe. This pressure shall be maintained for a minimum of 2 hours, during which time the line shall be checked for leaks. Measured rate of water leakage shall not exceed the allowable leakage listed below.

Allowable leakage in gallons per hour, per 1,000 feet of exterior pipeline:

<u>Test Pressure</u>	<u>Nominal Pipe Diameter [inches]</u>					
	4	6	8	10	12	16
150 psi	0.36	0.55	0.74	0.92	1.10	1.47

Interior piping in vaults, building, etc., shall have zero leakage.

Should leakage exceed this rate, the Contractor shall immediately locate the leak or leaks and repair them. Pipe will be accepted only when leakage is zero, or less than the allowable amount. Approval does not absolve the Contractor from responsibility if leaks develop later within the warranty period.

### 3.8 PRESSURE TESTING OF SEWER GRAVITY MAIN

- A. On completion of a section of sewer, including building connections installed to the property line, the Contractor shall install suitable bulkheads as required, dewater and test the sewer for leakage.
- B. Unless otherwise approved, the section shall be tested using low pressure air test procedures. If circumstances permit, the Engineer may allow testing by infiltration or exfiltration in lieu of air testing.
- C. The air test procedures shall conform to the Uni-Bell Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe, UNI-B-6. The starting air pressure for the test shall be 4 psi. The minimum duration permitted for the prescribed low pressure air exfiltration pressure drop between two consecutive manholes shall not be less than provided in Table I or Table II of UNI-B-6. The two tables are reproduced on the following pages.
- D. The pipeline shall be made as nearly watertight as practicable, and leakage tests and measurements shall be made after the pipeline has been backfilled. Where the groundwater level is more than 1 ft. above the top of the pipe at its upper end, the Contractor, with the authorization of the Engineer, conduct either infiltration tests or low pressure air test. Where the groundwater level is less than 1 ft. above the top of the pipe at its upper end, the Contractor, with the authorization of the Engineer, shall conduct either exfiltration tests or low pressure air tests. At the time of the test, the Contractor shall determine the groundwater elevation from observation wells, excavations or other means, all subject to review by the Engineer.
- E. For making the low pressure air tests, the Contractor shall use equipment specifically designed and manufactured for the purpose of testing sewer pipelines using low pressure air. The equipment shall be provided with an air regulatory valve or air safety so set that the internal air pressure in the pipeline cannot exceed 8 psig.
- F. The leakage test using low pressure air shall be made on each manhole-to-manhole section of pipeline after placement of the backfill. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be tested. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
- G. All air used shall pass through a single control panel.
- H. Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4 psig. greater than the maximum pressure exerted by the groundwater that may be above the invert of the pipe at the time of the test. However, the internal air pressure in the sealed line shall not be allowed to exceed 8 psig. When the maximum pressure exerted by the groundwater is greater than 4 psig., the Contractor shall

conduct only an infiltration test. At least two minutes shall be allowed for the air pressure to stabilize in the section under test. After the stabilization period, the low pressure air supply hose shall be quickly disconnected from the control panel. The time required in minutes for the pressure in the section under test to decrease from 3.5 to 2.5 psig. (greater than the maximum pressure exerted by groundwater that may be above the invert of the pipe) shall not be less than that shown in the following table:

Pipe diameter in inches	Minutes
6	3.0
8	4.0
10	5.0
12	5.5
15	7.5
18	9.0
21	10.0
24	11.5
27	13.0

- I. For making the infiltration and exfiltration tests, the Contractor shall furnish suitable test plugs, water pumps, and appurtenances, and all labor required to properly conduct the tests on sections of acceptable length.
- J. For making the infiltration tests, under drains, if used, shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable.
- K. Upon completion of a section of the sewer, the Contractor shall dewater it and conduct a satisfactory test to measure the infiltration for at least 24 hours. The amount of infiltration, including manholes, tees, and connections, shall not exceed 200 gal. per inch diameter per mile of sewer per 24 hours.
- L. For making the exfiltration tests, the sewers shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 ft. above the top of the sewer at its upper end. Where conditions between manholes, may result in test pressures which would cause leakage at the stoppers in branches, provisions shall be made by suitable ties, braces, and wedges to secure the stoppers against leakage resulting from the test pressure. The rate of leakage from the sewers shall be determined by measuring the amount of water required to maintain the level 2 ft. above the top of the pipe.
- M. Leakage from the sewers under test shall not exceed the requirements for leakage into sewers as hereinbefore specified. The sewers, including, but not limited to mainlines, services, chimneys, and fittings, shall be tested before any connections are made to buildings. The Contractor shall construct weirs or other means of measurements as may be required. Suitable bulkheads shall be installed, as required, to permit the test of the sewer.
- N. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation.

- O. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedures for any reason, acceptable modifications in the procedures shall be made as required, but in any event, the Contractor shall be responsible for the ultimate tightness of the line within the above test requirements.

### 3.9 MANHOLE LEAKAGE TESTS

- A. Leakage tests shall be made by the Contractor, and observed by the Engineer on each manhole. The test shall be by vacuum or by water exfiltration as described below.
- B. Vacuum Test: The vacuum test shall be conducted in accordance with ASTM C1244. Test results will be judged by the length of time it takes for the applied vacuum to drop from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from are shown as follows.

Minimum Test Times for Various Manhole Diameters

Depth (Feet)	Diameter (Inches)		
	48	60	72
	<u>Times (Seconds)</u>		
0-12	30	39	49
12-16	40	52	67
16-20	50	65	81
20-24	59	78	97
26-30	74	98	121

If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified below.

- C. Water Exfiltration Test: After the manhole has been assembled in place, all lifting holes shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blow out. The test shall be made prior to placing the shelf and invert. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test.
  - 1. The manhole shall be filled with water to the top of the cone section. If the excavation has not been backfilled and observation indicates no visible leakage, that is, no water visibly moving down the surface of the manhole, the manhole may be considered to be satisfactorily water-tight. If the test, as described above, is unsatisfactory as determined by the Engineer or if the manhole excavation has been backfilled, the test shall be continued. A period of time may be permitted if the Contractor, so wishes, to allow for absorption by the manhole. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and a measuring time of at least 8 hours begun.

At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be extrapolated to a 24-hour loss rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made as directed by the Engineer to bring the leakage within the allowable rate of one gallon per foot per day. Leakage due to a defective section or joint or exceeding the 3 gallon per vertical foot per day, shall be cause for rejection of the manhole. It shall be the Contractor's responsibility to uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as directed by the Engineer. The manhole shall then be retested and, if satisfactory, interior joints shall be filled and pointed.

2. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the Engineer that the water table is below the bottom of the manhole throughout the test.
3. If the groundwater table is above the highest joint in the manhole, and there is no leakage into the manhole, as determined by the Engineer, such a test can serve to evaluate water-tightness of the manhole. However, if the Engineer is not satisfied with the results, the Contractor shall lower the water table and carry out the test as described hereinbefore.

### 3.10 CLEANING AND REPAIR

- A. The Contractor shall clean the entire sewer system of all debris and obstructions. This shall include, removal of all formwork from structures, concrete and mortar droppings, construction debris and dirt. The system shall be thoroughly flushed clean and the Contractor shall furnish all necessary hose, pumps, pipe and other equipment that may be required for this purpose. No debris shall be flushed into existing sewers, storm drains or streams. All work of cleaning and repair shall be performed at no additional cost to the Owner.

### 3.11 DEFLECTION TESTING

- A. Allowable Deflection Test
  1. Pipe deflection measured not less than ninety days (90) after the backfill has been completed as specified shall not exceed five (5.0) percent. Deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
  2. Deflection shall be measured with a rigid mandrel (Go/No-Go) device cylindrical in shape and constructed with a minimum of nine or ten evenly

spaced arms or prongs. Drawings of the mandrel with complete dimensions shall be submitted to the Engineer for each diameter of pipe to be tested. The mandrel shall be hand pulled by the Contractor through all sewer lines.

3. Any section of sewer not passing the mandrel shall be uncovered at the Contractor's expense and the bedding and backfill replaced to prevent excessive deflection. Repaired pipe shall be retested.

### 3.12 FINAL INSPECTION

- A. Upon Completion of the work, and before final acceptance by the Engineer, the entire sewer system shall be subjected to a final inspection in the presence of the Engineer. The work shall not be considered as complete until all requirements for line, grade, cleanliness, leakage tests and other requirements have been met.

END OF SECTION

## SECTION 02616

### DUCTILE IRON PIPE AND FITTINGS

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK

- A. Contractor shall furnish and install ductile iron water main, fittings and other appurtenances, and provide all other materials, equipment, labor and incidentals; provide for the installation and testing; of all furnished materials, as indicated and specified.

##### 1.2 RELATED WORK

- A. Earthwork specifications are included in Section 02200.
- B. Hydrants, valves and appurtenance specifications are included in Section 02640.

##### 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
  - 1. Submit shop drawings or descriptive literature, or both, showing dimensions, joint and other details for each type and class of pipe, fitting and restraint system to be furnished for the project. All materials furnished under the Contract shall be manufactured only in accordance with the Specifications. Submittals shall include material information, dimensions, pipe class information, weights, coating and lining system data.
  - 2. Submit manufacturer's Certificates of Compliance with these Specifications and certification that the ductile iron pipe and fittings have been manufactured and tested in accordance with AWWA/ANSI specifications.
  - 3. Submit the vendor's name, address and contact phone number for all materials to be furnished under the contract.
  - 4. Submit a detailed description of the proposed testing, flushing and disinfection procedures to be used for this project. This description shall contain the name of the person responsible for testing, flushing and disinfection work equipment and chemicals to be used; and method of measuring flow during flushing procedures. Submit the name of the laboratory to be used for analysis. Review of this description shall not be construed as an approval of any methods to be used; the Contractor shall be fully responsible for achieving the specified test results.

##### 1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Inspect and test at foundry according to applicable standard specifications.

- C. Owner reserves right to inspect and test by independent service at manufacturer's plant or elsewhere at their own expense.
- D. Visually inspect and hammer test before installation.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610.

#### 1.6 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs 60,000 PSI Tensile Strength.
- B. American Water Works Association (AWWA)
  - 1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pressure Pipe and Fittings
  - 2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
  - 3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings for Water
  - 4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  - 5. AWWA C115 - Standard for Flanged Ductile-Iron Pipe with Threaded Flanges
  - 6. AWWA C150 - Thickness Design of Ductile-Iron Pipe
  - 7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids
  - 8. AWWA C153 - Ductile-Iron Compact Fittings, 3-in through 16-in for Water and Other Liquids
  - 9. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
  - 10. AWWA C651 - Disinfecting Water Mains
- C. American National Standards Institute (ANSI)
  - 1. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings
- D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.



## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Ductile iron pipe, furnished and installed by Contractor, shall be that of a manufacturer who can demonstrate at least 5 years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push-on type, restrained joint, or mechanical joint, as required.
- B. Ductile iron pipe shall conform to the latest edition of AWWA C150 and C151, Class 52.
- C. Gaskets, furnished and installed by Contractor, shall meet the material requirements of ANSI/AWWA C111 for mechanical joint gaskets.
- D. Fittings, furnished and installed by Contractor, shall be compact ductile iron Class 350 Mechanical Joint, conforming to ANSI Specification A21.53 (AWWA C153), latest edition. Fittings shall be suitable for use with restraints as specified hereinafter. Fittings shall be manufactured in the United States. Fittings shall be made of the same material and have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends.
  - 1. Hydrant tees shall have a rotatable mechanical joint gland on the 6-inch plain end branch to provide positive valve restraint, unless otherwise allowed by the Engineer.
  - 2. Caps and plugs, installed in all new work as indicated on the drawings, shall be provided with a threaded corporation or bleeder valve so that air and water pressure can be relieved prior to a future connection.
- E. All pipe and fittings shall have a bituminous outside coating in accordance with AWWA C151 and C110, respectively, latest edition. All pipe and fittings shall be cement-mortar lined and seal coated in accordance with AWWA C104, latest edition. Cement mortar lining shall be double thickness.
- F. Polyethylene encasement shall be “V-Bio” enhanced polyethylene encasement as manufactured by the ductile-iron pipe research association (DIPRA), or approved equal.
- G. Joints for pipe and fittings shall be push-on or mechanical joints conforming to AWWA C111, latest edition.
- H. Restrained joints, furnished and installed by Contractor, shall be furnished for thrust restraint for installation on all fittings and valves, where indicated on the drawings, or where required by the Engineer. All mechanical joint bolts shall be Cor-Ten, or equal. Restraints for mechanical joints shall be Series 1100 Megalug as manufactured by EBAA Iron or approved equal.

- I. Restraints for push-on joints, furnished and installed by Contractor, shall be Stargrip Series 3100P as manufactured by Star Pipe Products, Series 1700 as manufactured by EBAA Iron, or approved equal.
- J. Sleeve type couplings, furnished and installed by Contractor, shall be of cast or ductile iron, consisting of a middle ring, two rubber gaskets and the followers with stainless steel bolts and nuts. Coupling and gaskets shall be sized for the particular application. Gaskets shall be of a material suitable for exposure to liquid within the pipe. Couplings shall be Hymax series as manufactured by Krausze USA or approved equal.
- K. Water main insulation, furnished and installed by Contractor, shall be 2-inch thick polyisocyanurate foam with a density of 2.0 lbs/cf<sup>3</sup>. A 30-mils thick bitumen adhesive shall be used as a vapor and moisture barrier for direct burial applications.
- L. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth no greater than 18 inches below finish grade.

### PART 3 – EXECUTION

#### 3.1 HANDLING PIPE

- A. The Contractor shall take care not to damage pipe by impact, bending, compression, or abrasion during handling, and installation. Joint ends of pipe shall be kept especially clean.
- B. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.
- C. Only nylon-protected slings shall be used for handling the pipe. No hooks, chains or bare cables will be permitted.
- D. Gaskets shall be shipped in cartons and stored in a clean area, away from grease, oil, heat, direct sunlight and ozone producing electric motors.

#### 3.2 LAYING DUCTILE IRON PIPE AND FITTINGS

- A. The Contractor will be responsible for receiving materials at the job site as needed. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe, lining or coatings. Pipe or fittings shall not be dropped. The engineer shall examine all pipes and fittings prior to installation. Any pipe or fittings found defective shall not be installed and immediately removed from the site. Any damage

to pipe linings or coatings may be repaired as directed by the Engineer or removed from the site. Handling and installation of pipe and fittings shall be in accordance with the manufacturer's instruction and as specified herein. Any materials damaged during loading, transporting or unloading shall be replaced at the Contractor's expense.

- B. Jointing of ductile iron pipe and fittings shall be done in accordance with the printed recommendations of the manufacturer and as specified. All pipe and fittings shall be thoroughly cleaned before laying; shall be kept clean until they are used in the work; and when installed, shall conform to the lines and grades required. Special care is required in cleaning the ends of the pipe; wipe the outside of the spigot end with a clean rag prior to applying lubricant; brush clean the inside of the bell end, paying special attention to the rubber joint area, prior to installing the gasket and lubricant; and check inside the pipe for overall cleanliness.
- C. When connecting ductile iron pipe to cast iron pipe the Contractor shall use sleeve couplings. When connecting ductile iron pipe to ductile iron pipe the Contractor shall use solid sleeve mechanical joint fittings.
- D. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600, latest edition, except as otherwise provided herein. The joint surfaces and the gasket shall be painted with a lubricant just prior to making up the joint. The spigot end shall then be gently pushed home into the bell. The position of the gasket shall be checked to insure that the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint. A firm, even bearing throughout the length of the pipe shall be constructed by tamping selected common fill along the sides of the pipe forming a cradle under the pipe. Tamping shall continue until the fill is 1-foot over the top of the pipe. Pipe installation in rock shall be constructed as shown on the drawings. (See Detail Sheet/Drawings). A 5-foot minimum cover shall be maintained over the top of the pipe. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his/her own expense.
- E. All pipe shall be sound and clean before laying. During pipe installation, care should be taken to protect the open end of the pipe. When installation is not in progress, including lunch time, the open ends of the pipe shall be closed with watertight plugs or other approved means. Good alignment shall be preserved during installation. Fittings, in addition to those shown on the Drawings, shall be provided, when required, for crossing utilities which are encountered during trench excavation. Solid sleeves shall be used only where approved by the Engineer.
- F. When pipe cutting is required, cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be jointed with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall remain undamaged.

- G. The Contractor shall have on hand at the start of the job, the following additional bends for each size of pipe to be installed: two 1/32 bends, two 1/16 bends and two 1/8 bends. These bends shall be replaced each time job conditions require their use.
- H. Existing Utilities. To the extent possible, the Contractor shall maintain a minimum 10 ft. lateral separation between the new water mains and existing sanitary sewers, unless otherwise directed by the Engineer.
- I. When crossing an existing sanitary sewer, the water main is preferred to cross above the sewer. The Contractor shall maintain an 18-inch clearance between the bottom of the water main and crown of the sanitary sewer. At crossing, the center of a full length of water pipe shall be located above the sewer so that both joints will be located as far from the sewer as possible. The engineer may direct this full length of main to be concrete encased when the 18-inch clearance is not possible, or when the water main is placed below the sanitary sewer.
- J. The Contractor shall maintain a minimum clearance between the new water main and all other existing utilities of at least 12 inches, except when otherwise directed by the Engineer.
- K. New water mains shall pass under all existing utilities, except sewers unless otherwise noted on the Drawings or directed by the Engineer.
- L. Ductile iron pipe installed within 5 feet of gas lines shall be fully encased with polyethylene material. Polyethylene, furnished and installed by the Contractor, shall be 8-millimeters thick and comply with AWWA C105, latest edition.
- M. Ductile iron pipe shall be wrapped in polyethylene encasement where pipe depth is at or below normal groundwater level.
- N. Water pipe, to be installed with less than 4-feet of cover or where shown on the drawings, shall be wrapped with an insulating foam jacket suitable for direct burial applications.

### 3.3 PUSH-ON JOINTS

- A. Push-on joints shall be made in accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. Apply thin film of nontoxic gasket lubricant over inner surface of gasket in contact with spigot end. The plain end of the pipe being installed shall be aligned and inserted into the bell end of the pipe previously installed. It can then be pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

### 3.4 MECHANICAL JOINTS

- A. Mechanical joints shall be made in accordance with Appendix A of AWWA C111 and the manufacturer's instructions. Wire brush surfaces to be in contact with the

gasket and thoroughly clean and lubricate the joint surfaces and rubber gasket with soapy water before assembly. Check that the gasket has been seated in fitting before placing flange against gasket. With bolts inserted and nuts finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint with a torque wrench. Bolts shall all be tightened to the specified torque. When using pneumatic or electric impact wrenches to make up fittings, complete tightening using a torque wrench to the specified torque. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

### 3.5 RESTRAINED JOINTS

- A. Mechanical joint restraints shall be installed in full accordance with the manufacturer's instructions. All bolt heads on Megalug restraints shall be tightened sufficiently so that they shear off to indicate the proper tightening torque was achieved.
- B. Push-on joint restraints shall be installed in full accordance with the manufacturer's instructions where directed by the Engineer.

### 3.6 SLEEVE TYPE COUPLINGS

- A. Couplings shall be installed where shown. Couplings shall not be assembled until adjoining push-on joints have been assembled. Clean pipe ends for a distance of 8 inches. Mark each end six inches from the end. Use soapy water as gasket lubricant. Slip follower and gasket over each pipe to the 6-inch marks. Place the middle ring on the pipe end until centered over joint. Insert other pipe end into middle ring and bring to the proper position in relationship to the pipe installation. Press gaskets and followers into middle ring flares. Check gaskets have been seated into middle ring flares correctly. With bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts sequentially with a torque wrench to the specified torque as per manufacturer's recommendation. After installation, apply a heavy bitumastic coating to bolts and nuts.

### 3.7 CONNECTIONS TO WATER MAIN

- A. The Contractor shall make all connections to the existing mains as indicated in the Contract Documents.
- B. The Contractor shall develop a program for the construction and putting into service of the new work subject to the approval of the Engineer. All work involving cutting into and connecting to the existing water mains shall be planned so as to interfere with the operation of the existing facilities for the shortest possible time.
- C. The Contractor shall have all preparatory work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the work in one continuous operation.
- D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting his operations to the requirements of the Owner.

- E. Under no circumstances shall any customer be without water for a period of more than 4 hours without prior written approval of the Owner. Should it appear that any customer will be without water for more than 4 hours, the Contractor shall install a temporary water service at no additional cost to the Owner.
- F. The Owner does not guarantee a tight shut-off for existing local community water valves. The Contractor shall not submit a claim for damages due to delays in dewatering pipelines caused by water leaking through an existing closed valve, or having to dewater the excavation while making the connection. It is the Contractor's responsibility to provide the means to dewater the excavation while making the connection.
- G. Existing asbestos pipe shall be handled, removed and disposed of in accordance with all State and Federal requirements.

### 3.8 TESTING AND DISINFECTION

- A. Prior to pressure and leakage tests, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease and other foreign materials. This work shall be done with care to avoid damage to lining and coatings.
- B. The Contractor shall submit a plan on the method of testing and chlorinating the mains for review. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company, which will perform the work. Testing of the water main shall not begin until the Engineer has approved the Contractor's plan. All testing shall be done in the presence of the Engineer.
- C. Testing of Water Main:
  - 1. The Contractor, in accordance with ANSI/AWWA C600 specifications or latest revision thereof, will make all pressure and leakage tests to determine that the ductile iron pipe is structurally safe and free of excess leakage. The Contractor shall furnish all the equipment, materials and labor required for testing. The Contractor shall furnish, at his own expense, all the water needed for all water main testing.
  - 2. Testing shall be done in sections of the main not to exceed a 3,000-foot maximum length. Valves shall be placed in the off position at the ends of the sections to be tested. The Contractor shall provide means to prevent water from entering other parts of the pipeline not subject to testing at all times. Contractor will ensure that air release valves and other venting devices are properly installed and placed in open position when filling pipe with water.
  - 3. After all entrapped air has been removed from the section; fill the main to the normal static pressure. The Contractor is allowed to let the main rest for up to 48 hours with static pressure. Using a special pressure pump, the Contractor shall raise the pressure to 150 pounds per square inch. The pump will then be shut off and separated from the test section by a globe valve. A fluid filled pressure gage, with a maximum reading of 250 psi, shall have

been placed beyond the globe valve. The test section will then be monitored for a 2-hour period

4. This pressure shall be maintained, within 5 psi, for a minimum of 2 hours during which time the line checked for leaks by the Engineer. Based on an average test pressure of 150 psi, the measured rate of water leakage shall not exceed the following rates in the section under test:

$$L = \frac{12.25SD}{133,200}$$

Where: L = Allowable leakage, gallons per hour  
S = Length of pipe section tested, feet  
D = Nominal pipe diameter, inches

5. Should leakage exceed this rate, the Contractor shall immediately locate the leak or leaks and repair same at his expense. Pipe shall be flushed and chlorinated when leakage does not exceed above standard. Approval does not absolve the Contractor from his responsibility if leaks develop within the new main or water services (to curb box) later within the warranty period.

D. Chlorinating and Flushing:

1. The Contractor, in accordance with the latest edition of ANSI/AWWA 651 Standard for Disinfecting Water Mains, shall chlorinate and flush the new water main. Chlorinated water to be flushed from the pipeline shall be de-chlorinated as shown on detail drawings or as approved by the Engineer. It shall then be discharged to the nearest storm drain. Chlorinated water shall not be discharged to any natural water body.
2. Prior to chlorination, the Contractor shall properly flush the water mains. In general, flushing shall be performed at a flow rate required to achieve a minimum velocity of 3.0 feet per second, which is approximately 470 GPM in an 8-inch diameter main, 730 GPM in a 10-inch main, 1,060 GPM in a 12-inch main and 1,880 GPM in a 16-inch main. Flushing of the water main, at the above rates, for approximately 20-minutes per 1,000-foot section, will allow for three volume changes. This is a sufficient period of time for successfully cleaning the water main.
3. The Contractor shall chlorinate the water main until the main contains a solution containing 25 mg/L available chlorine. The valves shall then be closed and the chlorinated water allowed to sit in the mains for 24 hours. The main will then be checked to assure the chlorine residual shall be at least 10 mg/L. If less than 10 mg/L is measured, the Contractor shall flush and re-chlorinate the mains at no cost to the Owner. All valves and hydrants shall be operated to insure their proper disinfection. Valves shall be operated to prevent super chlorinated water from entering the existing distribution system. The Contractor shall then flush the mains until clear, clean water is being discharged.
4. Twenty-four hours after the main has been flushed of chlorinated water, bacteriological samples (total coliforms and heterotrophic plate count) shall be taken. Water samples shall be taken from corporation stops along the

length of the water main as designated by the Engineer. A minimum of two (2) samples shall be taken on each street, or two per 3,000 feet of pipe, whichever is greater. Each sample shall be taken in duplicate, in sterile bottles and sent to a State approved private laboratory for analysis. Prudence Island Water District personnel will collect the samples and submit them to a certified lab for testing. The results of the tests on these samples will determine the acceptance of the work and allow these new mains to be connected to the Town's system. The failure of any sample to pass the laboratory tests shall require the Contractor to reflush and re-chlorinate the mains and resample and test the water until acceptable results are obtained, all at no additional cost to the Owner. Furthermore, all Prudence Island Water District expenses arising from subsequent sampling efforts shall be deducted from monthly payment requisitions.

5. If, during construction, trench water has entered the main, or if in the opinion of the Owner's Engineer, excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at 200-foot intervals and shall be identified as to location. Additional sample taps shall be installed and removed at the Contractor's expense.
6. Contractor shall note that work under this Contract shall not be considered complete until the satisfactory installation and testing of the water mains have been completed.

END OF SECTION



## SECTION 02640

### HYDRANTS, VALVES, AND APPURTENANCES

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK

- A. The work covered under this section includes the furnishing of all plant, labor, equipment, appurtenances and materials, and in performing all operations in connection with installing and testing of the valves, hydrants, and appurtenances, furnished by the Owner, at the locations indicated and/or as directed, complete in place in accordance with the drawings and specifications.
- B. Where existing gate boxes and hydrants are to be removed the contractor is responsible for disposal, unless otherwise directed by the Owner.

##### 1.2 RELATED WORK

- A. Earthwork is included in Section 02200.
- B. Ductile iron pipe and fittings are included in Section 02616.

##### 1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
  - 1. Submit shop drawings and descriptive literature, showing valve dimensions and other details for each type and class of valve to be furnished.

##### 1.4 REFERENCE STANDARDS

- A. American Water Works Association (AWWA)
  - 1. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  - 2. AWWA C-213 - Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
  - 3. AWWA C-301 - Prestressed Concrete Pressure Pipe.
  - 4. AWWA C-303 - Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type.
  - 5. AWWA C500 - Gate Valves for Water and Sewerage System.
  - 6. AWWA C502 - Dry-Barrel Fire Hydrants.
  - 7. AWWA C504 - Standard for Rubber-Seated Butterfly Valves.
- B. Underwriters Laboratory (UL)
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

- A. Resilient wedge gate valves, furnished and installed by the Contractor, shall be iron body, resilient seated type meeting the latest edition of AWWA C515 with mechanical joint ends. The valves shall be designed for 200 psi working pressure and 400 psi test pressure. Valves shall have corrosion resistant fusion - bonded interior and exterior coatings.
- B. Valves are to have double O-ring seals and a non-rising stem. Valves shall have a 2-inch operating nut and be OPEN RIGHT (clockwise to open). An arrow indicating the opening position shall be cast into the operating nut.
- C. Valves shall be Mueller Co 2360 series or approved equal.
- D. Tapping sleeves and valves, furnished and installed by the Contractor, shall have resilient wedge gate valves as specified above with the following exceptions. Tapping sleeve shall be Mueller Co. Stainless Steel Tapping Sleeve Model H-304SS or H-304MJ. Sleeves shall meet ANSI/NSF 61 standards. Sleeve outlet shall have a 3/4" testing port with a 3/4" NPT brass test plug. Tapping valves shall be full port opening and be a Mueller Co. A-2360 Resilient Wedge Gate Valve or approved equal. Tapping valves shall be full part opening and have flanged by mechanical joint ends. Tapping sleeves for ductile-iron water mains shall be full body corrosion resistant stainless steel with high pressure sealing.
- E. Valve boxes, furnished and installed by the Contractor, shall be cast iron, asphalt coated, sliding type, adjustable, together with cast iron covers with the word "WATER" plainly cast in relief on the top surface. A minimum 6-inch overlap is required between sliding sections. The inside diameter of the bottom section shall be at least 5-1/4-inches and shall have a belled base. The top section shall be at least 6-1/8-inches and have top flanges. The bottom section shall be at least 36-inches in length. The top section shall be at least 26-inches in length and have a plain bottom. Valve boxes shall be manufactured in North America only.
- F. Yard Hydrant: Blow-off hydrant shall be self-draining, non-freezing type with a 4-foot (minimum) depth of bury. Hydrant shall be furnished with a 2-inch FIP vertical inlet connection, a non-turning operating rod and shall open to the left. Outlet shall be 2-1/2-inch NST or smaller with cap and extend a minimum of 12-inches above the finished grade.

All water flow shall pass thru a 2-inch steel pipe and waterway. The operating drive mechanism shall raise and lower a plunger to control the flow of water and shall be serviceable from above ground with no digging, with all working parts being brass, galvanized steel, or PVC. Said operating drive shall operate with a standard universal slotted valve wrench. When open, the flow of water shall be unobstructed, and the drain hole shall be covered.

Hydrant shall be set in 4 cubic feet of crushed stone to allow for proper drainage of hydrant. Crushed stone shall be wrapped with 4-ounce nonwoven geotextile. All geotextile seams shall have minimum 12-inch lap. Recommendation of the AWWA should be followed when installing the hydrant.

The MainGuard Model #77 blow-off hydrant shall be manufactured by the Kupferle Foundry, St Louis, MO. 63102 or approved equal.

- G. Yard hydrant shall be equipped as follows:
1. Hydrant shall be equipped with a locking cover to prevent water theft and protect against the elements.
  2. All hydrant moving parts shall be enclosed and made from high quality brass for greater durability and wear.
  3. Hydrant shall be capable of full draining after flushing to prevent freezing.
  4. Hydrant shall be manufactured in a manner which will allow all repairs to be made from top of unit, without removing hydrant from the ground.
- H. Yard hydrant shall meet all Federal and State Safe Drinking Water Acts and requirements.

### PART 3 – EXECUTION

#### 3.1 INSPECTION AND PREPARATION

- A. All hydrants, valves and appurtenances shall be installed in the location shown on the drawings or where directed by the Engineer. Valves shall be true to alignment and rigidly supported. Any damaged items shall be replaced before they are installed.
- B. During installation of all hydrants, valves and appurtenances, the Contractor shall verify that all the items are clean, free from defects in materials and workmanship and functioning properly. Valves and other equipment which do not operate easily, or are otherwise defective, shall be repaired or replaced.
- C. Tapping sleeves shall be installed in accordance with manufacturer's recommendations.
- D. All valves shall be closed and kept closed until otherwise directed by the Engineer. All hydrants shall be covered with a burlap bag until put into service.
- E. Care shall be taken to avoid freezing of water in valves or hydrants.

#### 3.2 FIELD TESTS AND ADJUSTMENTS

- A. Conduct a functional field test of each valve, including actuators and valve control equipment, if any, in the presence of the Engineer to demonstrate that each part and all components together function correctly. The Contractor shall provide all testing equipment.

### 3.3 MANUFACTURER'S SERVICE

- A. The Contractor shall coordinate the services of a qualified representative of the tapping equipment and/or tapping valve supplier to provide on-site support and assistance during wet tapping operations of the existing water mains as indicated on the Drawings.

### 3.4 SHOP PAINTING VALVES AND APPURTENANCES

- A. Interior and exterior surfaces of all valves which are not factory epoxy coated shall be given two coats of shop finish of an asphalt varnish conforming to the latest edition of AWWA C504 for Varnish Asphalt. The pipe connection openings shall be capped to prevent the entry of foreign matter prior to application.

### 3.5 INSTALLATION OF HYDRANTS

- A. Furnish all labor, equipment and incidentals required for the installation of hydrants and valves as shown on the Drawings and/or as directed by the Engineer.
- B. Contractor shall install hydrant in accordance with manufacturer's recommendation.
- C. Hydrants shall be painted in accordance with the Prudence Island Water District requirements.

### 3.6 FIELD TESTS AND ADJUSTMENTS

- A. Conduct a functional field test of each valve, including actuators and valve control equipment, if any, in the presence of the Engineer to demonstrate that each part and all components together function correctly. The Contractor shall provide all testing equipment.

### 3.7 INSTALLATION OF BURIED VALVES AND VALVE BOXES

- A. The Contractor shall furnish all necessary labor and equipment to excavate and expose the watermain sufficiently to install valves and/or tapping valves as required by the Engineer.
- B. Valves shall be cleaned and manually operated before installation. When tapping valves are installed, it is imperative that the shell cutting is removed and discarded. Valves shall be set on a firm foundation and supported by tamping pipe-bedding material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with the finished grade. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the valve box. The valve box shall be set so as not to transmit loads to the valve.
- C. Where ductile iron tapping sleeves are used, the split end flanges shall be rotated off center of the flange body to insure the gasket seams are not aligned.

- D. Tapping valves shall be thoroughly flushed after the tapping operation has been completed.
- E. Before backfilling, all exposed portions of any bolts shall be coated with two coats of bituminous paint comparable to Bitumastic No. 50 by Koppers Co., Inc. or equal.

END OF SECTION



## SECTION 02920

### TOPSOIL

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. The work of this section consists of manufacturing, delivering, and placing 4" of topsoil on prepared subgrade areas disturbed by construction. Topsoil, as available, may be stripped, screened, stockpiled and tested for reuse. Topsoil requirements in excess of available on-site will be imported. Both sources will be placed in compliance with this section.

##### 1.2 RELATED SECTIONS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section. Related Sections include the following:
  - 1. Section 02200 – Earthwork
  - 2. Section 02945 – Turf

##### 1.3 SUBMITTALS

- A. In accordance with Section-01300. Submit soil analysis report for imported topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay) and include additive recommendations for lawn areas. Field methods of analysis are acceptable, but laboratory report is preferred.

##### 1.4 PRODUCT HANDLING

- A. Do not deliver topsoil in frozen, wet, or muddy condition.

#### PART 2 - MATERIALS

##### 2.1 IMPORTED TOPSOIL

- A. Friable loam, typical of fertile local topsoil; free-from pure clay, weeds, noxious weed seeds, sod, clods and stones larger than 1 inch, toxic substances, litter, or other deleterious material; having a mildly alkaline to medium acid pH between 6.0 and 7.5. Soluble salts shall not exceed 4 milli-mhos per centimeter.
- B. Soil Texture: 20 to 40% fines (silt and clay fraction passing the 200 sieve) and 60 to 80% Sand and gravel. The maximum particle size shall be 1-inch.
- C. Organic Content: 5 to 10%

- D. Additives: As required by soil analysis of Topsoil for lawn areas.

### PART 3 - EXECUTION

#### 3.1 PLACING TOPSOIL

- A. Scarify compacted subgrade to a 2-inch depth to bond topsoil to subsoil. Place topsoil to a minimum depth of 4 inches for outside disturbed areas as shown on the Drawings. Spread evenly and grade to elevations and slopes shown. Hand rake areas inaccessible to machine grading. Use all available on-site stockpiled topsoil and supplement with off-site topsoil as required, including amendments.

END OF SECTION



## SECTION 02945

### TURF

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform all lawn installation and fine grading work and related items as indicated on the Contract Documents and/or as specified in this Section and includes, but is not necessarily limited to, the following:
  - 1. Seeding
  - 2. Maintenance and protection

##### 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this trade.
- C. The following items of related work are specified and included in other Sections of the Specifications:
  - 1. Section 02920 – Topsoil

##### 1.3 SUBMITTALS

- A. At least 90 days prior to the first day of the seeding season described in this Section, submit to the Engineer proof of certification of Foreman or Crew Leader as Rhode Island Certified Landscape Professional or Rhode Island Certified Horticulturist in accordance with QUALITY ASSURANCE paragraph of this Section.
- B. Submit proof of landscape contractor's experience to the Engineer in accordance with QUALITY ASSURANCE paragraph of this Section.
- C. At least 30 days prior to intended use, the Contractor shall provide the following samples and submittals for approval in conformance with the requirements of Division 1 Section, SUBMITTALS. Do not order materials until Engineer's approval of samples, certifications or test results has been obtained. Delivered materials shall closely match the approved samples. Acceptance shall not constitute final acceptance. The Engineer reserves the right to reject on or after delivery any material that does not meet these Specifications.

1. Material Sampling and Testing of Loam Borrow from On-Site or Off-Site Sources shall be specified, performed and paid for under Division 2 Section 2920, TOPSOIL (Outside Disturbed Areas), of this Specification.
  2. Fertilizer:
    - a. Submit product literature of seeding fertilizer and certificates showing composition and analysis.
    - b. Submit the purchasing receipt showing the total quantity purchased for the project prior to installation.
  3. Seed: Submit a manufacturer's Certificate of Compliance to the Specifications with each shipment of each type of seed. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates.
  4. Hydroseeding: Prior to the start of hydroseeding, submit a certified statement for approval as to the number of pounds of materials to be used per 100 gallons of water.
  5. Wood Cellulose Fiber Mulch: Submit 4 copies of manufacturer's literature and one material sample.
  6. Limestone: Submit supplier's certification that the limestone being supplied conforms to these Specifications.
  7. All additives needed to amend a specific soil in order to meet these specifications.
- D. Maintenance Instructions: At the time of Acceptance, the Contractor shall submit complete maintenance instructions for turf care for the Owner's use. The instructions shall be reviewed for approval by the Engineer as a pre-condition for Acceptance.

#### 1.4 EXAMINATION OF CONDITIONS

- A. All areas to be improved shall be inspected by the Contractor before starting work and any defects such as incorrect grading, or drainage problems shall be reported to the Engineer prior to beginning this work. The commencement of work by the Contractor shall indicate his acceptance of the areas to be improved, and he shall assume full responsibility for the work of this Division 2 Section, TURF.
- B. The Contractor shall be solely responsible for judging the full extent of work requirements involved.

#### 1.5 QUALITY ASSURANCE

- A. Qualification of Landscape Contractor: The work of this Division 2 Section, TURF, shall be performed by a landscape contracting firm which has successfully installed

work of a similar quality, schedule requirement, and construction detailing with a minimum of five years experience. Proof of this experience shall be submitted per SUBMITTALS paragraph of this Division 2 Section, TURF.

- B. Qualification of Foreman or Crew Leader: All work of seeding shall be supervised by a foreman or crew leader who is a certified landscape professional or a certified horticulturist.
  - 1. Landscape professional shall be a Rhode Island Certified Landscape Professional certified by the Associated Landscape Contractors of Rhode Island.
  - 2. Horticulturist shall be a Rhode Island Certified Horticulturist as certified by the Rhode Island Nursery and Landscape Association.
  - 3. Certification shall be current. Proof of certification shall be submitted per SUBMITTALS paragraph of this Division 2 Section, TURF.
- C. The ratio of laborers to certified landscape professionals or certified horticulturist shall not exceed twelve to one. Certified Landscape Professional or Certified Horticulturist shall be on the project site throughout the day to day performance of the work described in this Division 2 Section, TURF.

## PART 2 - PRODUCTS

### 2.1 LOAM

- A. Loam borrow shall be specified, provided, installed and paid for under the work of the Division 2 Section 02920, TOPSOIL, of this Specification.

### 2.2 SOIL ADDITIVES

- A. Soil additives shall be specified, provided and paid under Division 2 Section 02920, TOPSOIL, except for additional applications of fertilizer that shall be specified, provided and paid for under this Division 2 Section, TURF, based upon recommendations from soil analysis and testing as specified.

### 2.3 SEED

- A. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall the weed seed content exceed 0.25% by weight. The seed shall be furnished and delivered in the proportion specified below in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws. Submit manufacturer's Certificates of Compliance. Seed that has become wet, moldy or otherwise damaged shall not be acceptable. Tall fescue and rygrass shall contain *Acromonium* endophytes. Seed containing endophyte must be kept cool and dry at all times; do not stockpile in the sun.

1. Seed Mixture Composition for disturbed areas:

<u>Common Name</u>	<u>Proportion By Weight</u>	<u>Germination Minimum</u>	<u>Purity Minimum</u>
Tall Fescue (3 varieties minimum)	80%	85%	95%
Kentucky Bluegrass	10%	85%	95%
Perennial Rye	10%	90%	95%

- a. All grass varieties shall be within the top 50 percent of varieties tested in National Turfgrass Evaluation Program, or currently recommended as low maintenance varieties by University of Massachusetts or the University of Rhode Island.
- b. Seeding rate shall be 6 pounds per 1,000 square feet.

B. Seed may be mixed by an approved method on the site or may be mixed by a dealer. If the seed is mixed on the site, each variety shall be delivered in the original containers that shall bear the dealer's guaranteed analysis. If seed is mixed by a dealer then the Contractor shall furnish the Engineer the dealer's guaranteed statement of the composition of the mixture.

## 2.4 FERTILIZERS

A. Fertilizer shall be a commercial product complying with the State and United States fertilizer laws. Deliver to the site in the original unopened containers that shall bear the manufacturer's certificate of compliance covering analysis. Fertilizer shall contain not less than the percentages of weight of ingredients as recommended by the soil analysis specified, performed and paid for under the Division 2 Section, TOPSOIL, of this Specification.

## 2.5 LIMESTONE

A. Ground limestone for adjustment of loam borrow pH shall contain not less than 85 percent of total carbonates and shall be ground to such fineness that 40 percent will pass through 100 mesh sieve and 95 percent will pass through a 20 mesh sieve. Contractor shall be aware of loam borrow pH and the amount of lime needed to adjust pH to specification in accordance with testing lab recommendations.

## 2.6 WOOD CELLULOSE FIBER MULCH

A. Mulch to cover hydroseeded areas with slopes less than 3 to 1 shall be fiber processed from whole wood chips and clean recycled newsprint in a 1:1 proportion

manufactured specifically for standard hydraulic mulching equipment. Fiber shall not be produced from recycled material such as sawdust, paper, or cardboard.

- B. Moisture content shall not exceed 10 percent, plus or minus 3 percent as defined by the pulp and paper industry standards. Fiber shall have a water holding capacity of not less than 900 grams water per 100 grams fiber.
- C. The mulch shall be of such character that the fiber will be dispersed into a uniform slurry when mixed with water. It shall be nontoxic to plant life or animal life.
- D. The mulch shall contain a non-petroleum based organic tackifier and a green dye to allow for easy visual metering during application but shall be non-injurious to plant growth.

## 2.7 HERBICIDES, CHEMICALS AND INSECTICIDES

- A. Provide chemicals and insecticides as needed for fungus or pest control. All chemicals and insecticides shall be approved by the Rhode Island Department of Food and Agriculture for the intended uses and application rates.
- B. Provide post-emergent crab grass control throughout the maintenance period to ensure a germinated and mown lawn free of crab grass.

## 2.8 WATER

- A. The Contractor may use water provided by the Town upon request and approval of the DPW, if available. The Contractor shall be responsible to furnish his own supply of water to the site at no additional cost to the Owner. If Town water is not available, the Contractor shall be responsible to furnish adequate supplies at his own cost. All work injured or damaged due to the lack of water or use of too much water, shall be the Contractor's responsibility to correct. Water shall be free from impurities injurious to vegetation. The Contractor's use of Town water shall be at his own risk.

## PART 3 - EXECUTION

### 3.1 FILLING AND COMPACTION

- A. Filling and compaction of loam shall be specified, performed and paid for under the work of the Division 2 Section, TOPSOIL, of this Specification.

### 3.2 FINE GRADING

- A. Fine grading shall be specified, performed and paid for under the work of the Division 2 Sections, Earthwork, Rough Grading and Topsoil, of this Specification.

### 3.3 SEEDING

- A. Contractor shall obtain Engineer's written approval of fine grading and bed preparation before doing any seeding.

- B. Limit of proposed grading shall be limit of seeding unless otherwise indicated on the Contract Documents. All lawn areas disturbed outside the limit of seeding shall be prepared and seeded as specified herein at no additional cost.
- C. The season for seeding shall be from April 1 to May 31 and from August 15 to September 30. The actual planting of seed shall be done, however, only during periods within this season which are normal for such work as determined by weather conditions and by accepted practice in this locality. To prevent loss of soil via water and wind erosion and to prevent the flow of sediment, fertilizer, and pesticides onto roadways, sidewalks, and into catch basins, seed loam areas within 5 Days of spreading the loam.
- D. Seed only when the bed is in a friable condition, not muddy or hard.
- E. Seeding of Disturbed areas shall be by Hydroseeding Method specified as follows:
  - 1. Prior to the start of work, furnish a certified statement as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of hydroseeding that can be covered with the quantity of solution in the hydroseeder.
  - 2. Hydroseed with wood cellulose fiber mulch at a rate as designated above in Part 2 – PRODUCTS.
  - 3. For the hydroseeding process, a mobile tank with a capacity of at least 500 gallons shall be filled with water and the mixture noted above in the specified proportions. The resulting slurry shall be thoroughly mixed by means of positive agitation in the tank. Apply the slurry by a centrifugal pump using the hose application techniques from the mobile tank. Only hose application shall be permitted. At no time shall the mobile tank or tank truck be allowed onto the prepared hydroseed beds. The hose shall be equipped with a nozzle of a proper design to ensure even distribution of the hydroseeding slurry over the area to be hydroseeded and shall be operated by a person thoroughly familiar with this type of seeding operation.
  - 4. Contractor shall obtain Engineer's written approval of fine grading and bed preparation before doing any hydroseeding.
  - 5. Limit of work shall be limit of hydroseeding unless otherwise indicated on the Contract Documents. All lawn areas disturbed outside the limit of hydroseeding shall be hydroseeded.
  - 6. Seed only when the bed is in a friable condition, not muddy or hard. Construction methods shall conform to hydraulic method requirements specified in the Standard Specification.
  - 7. Hydroseeding shall be a two-step process.

- a. Step one shall consist of spreading 100 percent of the required seed uniformly over the prepared loam bed so that the seed comes into direct contact with the soil. To mark the progress of the hydroseeding operation the Contractor may add 10 percent of the wood cellulose fiber mulch to the slurry.
- b. Step two shall consist of a separate application of wood cellulose fiber mulch immediately following the first step of hydroseeding noted above. Apply the wood cellulose fiber mulch at a rate of 2,000 pounds per acre.

### 3.4 TURF MAINTENANCE

- A. Maintenance shall begin immediately after any area is seeded or sodded and shall continue for a 60 day active growing period for seeded areas or until Final Acceptance, whichever is longer following the completion of all lawn construction work, and until final acceptance of the project. In the event that seeding operations are completed too late in the Fall for adequate germination and growth of grass, then maintenance shall continue into the following Spring for the minimum 60 Day period and including the One (1) Year Maintenance Period.
- B. Maintenance shall include re-seeding, two (2) mowings, watering, weeding, fertilizing a minimum of two times in addition to the fertilizer incorporated by harrowing into the spread loam, and resetting and straightening of protective barriers. Lawn work maintenance shall also include chemical treatments as required for fungus and/or pest control.
- C. During the maintenance period, any decline in the condition of turf areas shall require immediate action to identify potential problems and to undertake corrective measures.
- D. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment.
  1. The Contractor shall provide all labor and arrange for all watering necessary to establish an acceptable lawn. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary to maintain moist soil to a depth of at least two (2) inches for seeded areas and four (4) inches for sodded areas. At no time shall a tank truck be allowed on the reseeded/re-sodded beds.
  2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply water to the required soil depths each 8-hour period.
- E. After the grass in seeded areas has germinated, reseed all areas and parts of areas that fail to show a uniform stand of grass. Reseed such areas and parts of areas repeatedly

until all areas are covered with a satisfactory growth of grass with no less than 20 grass shoots per square inch and 2880 grass shoots per square foot. Reseeding together with necessary grading, fertilizing, and trimming shall be done at the Contractor's expense.

F. Mowing and Edging:

1. The Contractor shall keep lawn areas mowed until Acceptance of the contract by cutting to a height of two (2) inches when growth reaches three (3) inches or as directed by the Engineer.
2. At each mowing, all edges of walks, drives, plant beds and other border conditions shall be edge trimmed by hand or machine to produce straight and uniform edge conditions.
3. Remove and discard from paved areas only clippings and debris generated by each mowing and edging operation legally off-site. Engineer, if practical and aesthetic, may allow sweeping (not blowing) clippings back into grass. Mowers shall be equipped with mulching blades. Do not remove from grass areas any clippings that have been generated by mowing operations. Do not mow grass when wet.

G. Fertilizing for seeded lawns: The first application of fertilizer is specified, provided, performed and paid for under the Division 2 Section, TOPSOIL. A second application of fertilizer shall be applied to seeded areas at the time of the first mowing and shall be performed and paid for under this Division 2 Section, TURF. This second application shall be applied at a rate that ensures that one-half pound of nitrogen is applied per 1,000 square feet. Phosphorus and potassium shall be applied proportionally in accordance with the recommendations of the soil tests and the quantities previously integrated into the soil during the first application. A third application of nitrogen fertilizer shall be applied to seeded areas approximately two months after the second application and shall be paid for under this Division 2 Section, TURF. This third application shall correspond to the following application rates dependent upon the month of application.

1. May 1-15: Apply 1.0 pound of nitrogen per 1,000 square feet.
2. June 15-30: Apply 1.0 pound of nitrogen per 1,000 square feet.
3. August 15 through September 15: Apply 1.0 pound of nitrogen per 1,000 square feet.
4. November 1-15: Apply 1.5 pounds of nitrogen per 1,000 square feet.

\*\*Nitrogen fertilizer shall be composed of 50 percent slowly soluble or slow release nitrogen fertilizer.



### 3.5 APPLYING LIMESTONE

- A. The Contractor shall return to the site at the beginning of the next seeding season as specified above and spread limestone across all lawn areas installed under this Contract. The work of liming the fields shall be as specified under Division 2 Section, TOPSOIL, of this Specification, and performed and paid for under this Division 2 Section, TURF. Limestone shall be spread at rates determined by the soil tests specified.

### 3.6 ACCEPTANCE

- A. Following the minimum required maintenance periods for lawn construction, the Contractor shall request the Engineer in writing for a formal inspection of the completed work. Request for inspection shall be received by the Engineer at least 10 Days before anticipated date of inspection.
- B. Acceptance Requirements:
  - 1. At the end of the maintenance period, seeded areas shall have a close stand of grass as defined above with no weeds present and no bare spots greater than 3 inches in diameter over greater than 5 percent of the overall seeded area. At least 90 percent of the grass established shall be permanent grass species. If seeded areas are deficient, the Contractor's responsibility for maintenance of all seeded areas shall be extended until deficiencies are corrected. Seeded areas to be corrected shall be prepared and reseeded in accordance with the requirements of this Division 2 Section, TURF.
- C. Furnish full and complete written instructions for maintenance of the lawns to the Owner at the time of acceptance in conformance with Submittals requirements.
- D. Engineer's inspection shall determine whether maintenance shall continue in any part.

### 3.7 CLEAN UP

- A. Absolutely no debris may be left on the site. Excavated material shall be removed as directed. Repair any damage to site or structures to restore them to their original condition, as directed by the Engineer, at no cost to the Owner.

END OF SECTION



## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDED:

- A. This Section covers all concrete and all related items necessary to place and finish the concrete work.
- B. General: Submit in accordance with Condition of Contract and Division 1 – General Requirements Specification Section.

##### 1.2 RELATED WORK:

- A. Section 03100, Concrete Formwork

##### 1.3 REFERENCES:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

#### American Concrete Institute (ACI)

ACI 301 Structural Concrete for Buildings

ACI 302 Recommended Practice for Concrete Floor and Slab Construction

ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Replacing Concrete

ACI 304.2R Placing Concrete by Pumping Methods

ACI 305 Recommended Practice for Hot Weather Concreting

ACI 306 Recommended Practice for Cold Weather Concreting

ACI 308 Standard Practice for Curing Concrete

ACI 318 Building Code Requirements for Reinforced Concrete

#### American Society for Testing and Materials (ASTM)

ASTM C31 Making and Curing Concrete Test Specimen.

ASTM C33 Concrete Aggregates

ASTM C39 Compressive Strength of Cylindrical Concrete Specimens

ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

ASTM C87 Effect of Organic Impurities in Fine Aggregate on Strength of Mortar

ASTM C94 Ready-Mixed Concrete

ASTM C143 Standard Method for Slumps of Portland Cement Concrete

ASTM C150 Portland Cement

ASTM C231 Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C260 Air-Entraining Admixtures for Concrete

ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C494 Chemical Admixtures for Concrete

- B. Where reference is made to one of the above standards, the revisions in effect at the time of bid opening shall apply.

#### 1.4 SUBMITTALS

- A. General: Submit in accordance with Condition of Contract and Division 1 – General Requirements Specification Section.
- B. Six sets of shop drawings of the materials specified herein shall be submitted to the Engineer for review.
- C. Submit sources of cement and aggregates and their conformance to referenced standards.
- D. Provide one copy of the "Certificate of Delivery" for each load of concrete as it arrives on the site, under the provisions of ASTM C94.
- E. Air-entraining admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
- F. Water reducing admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
- G. Mid or high range water-reducing admixture (plasticizer). Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, retarding effect, slump range and conformity to ASTM standards. Identify proposed locations of use.

- H. Sheet curing material. Product data including catalogue cut technical data and conformity to ASTM standard.
- I. Liquid curing compound. Product data including catalogue cut technical data, storage requirements, product life, application rate and conformity to ASTM standards. Identify proposed locations of use.
- J. Grout. Catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to specified standards.
- K. Submit concrete placing sequence to the Engineer for review and comment.
- L. Test Report
  - 1. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water-cementitious materials ratio, type and manufacturer of cement.
    - a. Standard deviation data for each proposed concrete mix based on statistical records.
    - b. Water-cementitious materials ratio curve for concrete mixes based on laboratory test. Give average cylinder strength test results at 28 days for laboratory concrete mix designs. Provide results of 7 and 14 day tests if available.
- M. Certifications
  - 1. Certify that admixtures used in the same concrete mix are compatible with each other and the aggregates.
  - 2. Certify that the Contractor is not associated with the independent testing laboratory nor does the Contractor or its officers have a beneficial interest in the laboratory.
- N. Qualifications
  - 1. Independent testing laboratory: Name, address and qualifications. Laboratories affiliated with the Contractor or in which the Contractor or corporate officers have a beneficial interest are not acceptable.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Sheet Curing Materials: Store in weathertight buildings or off the ground and under cover.
- B. Grout: Non-shrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.

## 1.6 QUALITY ASSURANCE

- A. Only one source of cement and aggregates shall be used on any one structure. Concrete shall be uniform in color and appearance.
- B. Damages and imperfections shall be corrected by the Contractor to the satisfaction of the Engineer at no additional cost to the Owner.
- C. All field-testing and inspection services required shall be provided by the Owner. The cost of such work, except as specifically stated otherwise, shall be paid for by owner. Methods of testing shall comply in detailed with the latest applicable ASTM method.
- D. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.
- E. If, during the progress of the work, the materials from the sources originally accepted change in characteristics, the Contractor shall, at the Contractor's expense, make new acceptance tests of aggregates and establish new design mixes. Such testing and design shall be accomplished with the assistance of a certified independent testing laboratory, retained by the Contractor, acceptable to the Engineer.

## 1.7 DEFINITION

- A. Non-shrink grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base material surface.

## PART 2 - PRODUCTS

### 2.1 CEMENT:

- A. The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to ASTM C150. The brand name and type of cement proposed for use shall be submitted to the Engineer for approval immediately following award of contract. Only one color of cement, all of the same manufacture, shall be used for the work.
- B. When the use of Portland cement Type III is permitted by the Engineer the same strength requirements shall apply, but the indicated strengths shall be attained in 7 days instead of 28 days.

### 2.2 AGGREGATES:

- A. Except as otherwise noted, aggregates shall conform to the requirements of ASTM C33.

- B. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM C33 and the following additional requirements:

Sieve	Retained Percent
#4	0 to 5
#16	25 to 40
#50	70 to 87
#100	93 to 97
Fineness Modulus	2.80 ( $\pm$ 0.20)
Organic	Plate 2 maximum
Silt	2.0% maximum
Mortar Strength	100% minimum
Soundness	Compression ratio 5% maximum loss, magnesium Sulfate, five cycles

- C. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33 and the following additional requirements:

Designated Size (inches)	3	2	1-1/2	1	¾	½	3/8
Fineness Modulus ( $\pm$ -0.20)	7.95	7.45	7.20	6.95	6.70	6.10	4.50
Organic	Plate 1 maximum						
Silt	1.0% maximum						
Soundness	5% maximum loss, magnesium Sulfate, five cycles						

Grading requirements shall be as listed in ASTM C33, Table 2 for the size number corresponding to the appropriate maximum coarse aggregate size. Limits of Deleterious Substances and Physical Property Requirements shall be as listed in ASTM C33, Table 3 for severe weathering regions. Size numbers for the concrete mixes shall be as shown in Table 03300-1.

TABLE 03300-1

Description	Maximum Coarse Aggregate Size	Size Number (ASTM C33 Table 2)
24-in thick or greater	1-1/2-in	467
Greater than 12-in thick	1-in	57
12-in thick or less	3/4-in	67
Peastone mix	3/8-in	8

2.3 WATER:

- A. Water shall be potable. Water for curing shall not contain any substance injurious to concrete, or which causes staining.

## 2.4 ADMIXTURES

- A. Admixtures shall be free of chlorides and alkalis (except for those attributable to water). When it is required to use more than one admixture in a concrete mix, the admixtures shall be from the same manufacturer. Admixtures shall be compatible with the concrete mix including other admixtures.
1. Air entraining agent shall be in accordance with ASTM C260. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
  2. Water reducing agent shall be a mid-range water reducer meeting ASTM C494, Type A, and contain no more than .05% chloride ions. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
  3. Superplasticizer agent shall be in accordance with ASTM C494, Type F or Type G and contain no more than 0.05% chloride ions. Product may be plant added or field added based on the best application considering distance, temperature and time. The treated concrete shall be capable of maintaining plastic state for two hours or longer depending on application. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
  4. Admixtures causing retarded or accelerated setting of concrete shall not be used without written approval from the Engineer. When allowed, the admixtures shall be retarding or accelerating water reducing or high range water reducing admixtures.
  5. Prohibited admixtures: Calcium chloride, thiocyanates and admixtures containing more than 0.05% chloride ions are not permitted.

## 2.5 MIXES

- A. Development of mix designs and testing shall be by an independent testing laboratory acceptable to the Engineer engaged by and at the expense of the Contractor.
- B. Select properties of ingredients to meet the design strength and materials limits specified in Tables 03300-2 and 03300-3 and to produce concrete having proper placeability, durability, strength, appearance and other required properties. Proportion ingredients to produce a homogenous mixture which will readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing excessive free water to collect on the surface.
- C. The design mix shall be based on standard deviation data of prior mixes with essentially the same proportions of the same constituents or, if not available, be developed by laboratory test. Water content of the concrete shall be based on a curve showing the relation between water cementitious ratio and 7 and 28 day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four or more points, each representing a average value of at least three test specimens at each age. The curves shall have a range of values sufficient to yield



the desired data, including the compressive strength specified, without extrapolation. The resulting mix shall not conflict with the limiting values for maximum water cementitious ratios and net minimum cementitious content as specified in Table 03300-3.

TABLE 03300-2

Design Strength*	Minimum Lab Strength at 7 Days
3000 psi	2100 psi
4000 psi	2800 psi

\*Specified compressive strength at 28 days

In no case, however, shall the resulting mix conflict with the limiting values for maximum water content and net minimum cement factor specified in Table 03300-3.

- D. The limiting strengths, cement factors and water contents for each mix shall be in accordance with Table 03300-3.

TABLE 03300-3

Minimum 28 Day Design Strength	Net Minimum Cement Factor* (100 lbs/cy)	Maximum Water Content** (gals/100 lbs of Cement)	Maximum Water-Cementitious Materials Ratio (by weight)
3000	6.11	6.4	0.58
4000	6.3	5.4	0.45
Pumped Concrete	6.3		0.45

\* Minimum. Increase as necessary to meet other requirements. These cement factors apply to “controlled” concrete subject to specific inspection.

\*\* Maximum. Decrease if possible. This represents total water in mix at time of mixing, including free water on aggregates and water in admixture solutions.

- E. Compression Test: Provide testing of the proposed concrete mix or mixes to demonstrate compliance with the compression strength requirements in conformity with the provisions of ACI 318.
- F. Entrained air, as measured by ASTM C231, shall be as shown in Table 03300-4.

TABLE 0033-4

Concrete Placement	Total Air Measured at Discharge From Truck (Percent)
Trowel finished slabs	3.5 maximum
All other concrete	4-6

1. If the air entraining agent proposed for use in the mix requires testing methods other than ASTM C231 to accurately determine air content, make special note of this requirement in the admixture submittal required under Paragraph 1.04.
- G. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 03300-5. If plasticizer is used, the slump indicated shall be that measured before plasticizer is added. Plasticized concrete shall have a maximum slump of eight inches.

TABLE 03300-5

Portion of Structure	Slump (inches)	
	Recommended	Range
Pavement and slabs on ground	2	1-3
Plain footings, slabs, beams		
Pads, curbs and sludge tank walls	2-3	1-4
Heavy reinforced foundation		
Walls and footings	3-4	2-5
Thin reinforced wall and columns	4	3-5

- H. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

## 2.6 CONCRETE

- A. Concrete conforming to the requirements listed below shall be used where indicated on the drawings. Unless otherwise indicated, concrete fill and concrete used as fill under foundations (mud slab), and elsewhere approved by the Engineer, shall be the 3,000 psi mix.

### CONCRETE STRENGTHS

Minimum Comp. Strength at 28 days (psi)	Maximum Water/ Cement Ratio Gallons per bag of cement)*	Cement Factor: 94 lb. bags Per cubic yard minimum**
3000	0.59 (6.9)	5.5
4000	0.48 (5.6)	6.5

\* Based on air-entrained concrete. If non-air-entrained concrete is called for, the listed maximum water/cement ratios may be increased slightly, as approved by the Engineer. The water is the total water in the mix, including free water on the aggregate.

\*\* These are minimum amounts; increase as necessary to meet mix requirements

- B. Concrete shall conform to ASTM C94. One copy of the Certificate of Delivery required by ASTM C94 shall be delivered to the Engineer immediately upon arrival

of each load of concrete at the site. The Contractor shall be responsible for the design of the concrete mixtures.

- C. Standard compression tests in conformity with the provisions of ACI 318 of all proposed mixes shall be made by the testing laboratory or other satisfactory evidence shall be presented that the design mixes will attain the minimum strengths listed on the design drawings or called for herein, within the limitations of the ACI Code. No concrete shall be delivered to the job site until the Engineer has approved the design mixes.
- D. All concrete (unless otherwise directed) shall contain an air-entraining agent. Air entrained concrete shall have an air content by volume, measured at discharge from truck, of 3 to 6 percent for 1-1/2-inch aggregate and 4 to 8 percent for 3/4-inch aggregate. The air content shall be the responsibility of the testing laboratory and in accordance with ASTM C231.
- E. All concrete shall contain a mid-range water reducer to minimize cement and water content of the mix, at the specified slump, in accordance with ASTM C494.
- F. Slump for all concrete shall be from 3-inch to 4-inch, except for concrete using a superplasticizer, when the maximum slump shall be 8 inches. Any concrete having a slump greater than 4 inches (8 inches with superplasticizer) shall be promptly removed from the site.
- G. No calcium chloride or admixtures containing calcium chloride shall be added to the concrete. No admixture other than those specified shall be used in concrete without the specific written permission of the Engineer in each case.
- H. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

## 2.7 GROUT:

- A. Non-metallic, non-shrink grout shall be pre-mixed, non metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensation agents, plasticizing and water reducing agents, complying with CRD-C588.

## 2.8 CURING MATERIALS:

- A. Curing compound shall be a curing/hardener compound such as Acurion by AntiHydro, Sikaguard Cure/Hard by Sika, Super Diamond Clear by Euclid or approved equal. Liquid membrane-forming curing compound shall comply with the requirements of ASTM C309 Type 1-D (clear or translucent with fugitive dye) and shall contain no wax, paraffin, or oil.

## 2.9 FLOOR HARDENER

- A. Floor hardener shall be a colorless aqueous solution containing zinc silicofluoride, magnesium silicofluoride, or sodium silicofluoride. These silicofluoride can be used

individually or in combination. Proprietary hardeners may be used if approved by the contracting officer.

### PART 3 - EXECUTION

#### 3.1 GENERAL:

- A. Under no circumstances shall concrete which has set or partially set before placing be used; and no retempering of concrete or grout will be permitted.
- B. The batching, mixing, transporting, placing and curing of concrete shall be subject to the inspection of the Engineer at all times. The Contractor shall advise the Engineer of his readiness to proceed at least six working hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment, cleanliness and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.
- C. Concrete mix showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed. If this does not correct the condition, the concrete shall be rejected. If the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed, changes in the concrete mix shall be obtained only by adjusting one or more of the following:
  - 1. The gradation of aggregate
  - 2. The proportion of fine and coarse aggregate.
  - 3. The percentage of entrained air, within the allowable limits.
- D. Furnish a delivery ticket for ready mixed concrete to the Engineer as each truck arrives. Each ticket shall provide a printed record of the weight of cement and each aggregate as batched individually. Clearly indicate the weight of fine and coarse aggregate, cement and water in each batch, the quantity delivered, the time any wage is added and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of transit mix trucks.

#### 3.2 PREPARATION:

- A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or other material which would tend to reduce the bond.
- B. Earth, concrete, masonry, or other water-permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed. No concrete shall be placed until the consolidation of the ground and the

arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

- C. When joining fresh concrete to concrete which has attained full set, the latter shall be cleaned by chipping, roughen to a ¼ inch amplitude, and washing off all dirt, scum and laitance. It then shall be moistened prior to placing new concrete.

### 3.3 MIXING AND TRANSPORTATION:

- A. Ready-mixed concrete shall be batched, mixed and transported in accordance with ASTM C94, except as otherwise specified. Truck mixers, agitators, and non-agitating units shall comply with National Ready-Mix Concrete Association (NRMCA) and Truck Mixer Manufacturers' Bureau (TMMB). Ready-mix plant equipment and facilities shall be certified in accordance with NMRCA QC 3. Site-mixed concrete shall be mixed in accordance with ACI 301. On-site plant shall conform to the NRMCA CPMB 100.
- B. No water from the truck system or elsewhere shall be added after the initial introduction of mixing water for the batch except when on arrival at the jobsite, the slump of the concrete is less than that specified. Water added to bring the slump within the specified range shall not change the total water in the concrete to a point that the approved water-cement ratio is exceeded. The drum shall be turned an additional 30 revolutions, or more, if necessary, until the added water is uniformly mixed into the concrete. Water shall not be added to the batch at any later time.
- C. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the name plate. Discharge at the site shall be within 1-1/2 hours after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.
- D. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI 304 and ASTM C94.
- E. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.
- F. Concrete shall be discharged within 1-1/2 hours after introduction of the cement to the aggregates, except that when the concrete temperature exceeds 85 degrees F, this time shall be reduced to 45 minutes. Concrete shall be placed within 15 minutes after it has been discharged from the truck.

G. Temperature and Mixing Time Control:

- a. In cold weather, maintain the as-mixed temperature of the concrete and concrete temperatures at the time of placement in the forms as indicated in Table 03300-6.
- b. If water or aggregate has been heated, combine water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.
- c. In hot weather, cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature of 90 degrees F. If necessary, substitute well-crushed ice for all or part of the mixing water.
- d. The maximum time interval between the addition of mixing water and/or cement to the batch, and the placing of concrete in the forms shall not exceed the following:

TABLE 03300-6

AIR OR CONCRETE TEMPERATURE (WHICHEVER IS HIGHER)	MAXIMUM TIME
80 degrees F to 90 degrees F	45 minutes
70 degrees F to 79 degrees F	60 minutes
40 degrees F to 69 degrees F	90 minutes

If an approved mid or high range water reducer (plasticizer) is used to produce plasticized concrete, the maximum time interval shall not exceed 90 minutes or other appropriate time such that workability and Contractor's ability to properly place the concrete will not be adversely compromised.

3.4 INSTALLATION/APPLICATION/ERECTION:

A. PLACING:

1. Verify that all formwork completely encloses concrete to be poured and is securely braced prior to concrete placement. Remove ice, excess water, dirt and other foreign materials from form. Confirm that reinforcement and other embedded items are securely in place.
2. No concrete shall be placed by pumping methods without the prior written approval of the Engineer. Should the Contractor be allowed to place concrete by pumping methods, procedures, mix design of concrete, and all other precautions shall be in accordance with ACI 304.2R and as approved by the Engineer.
3. Concrete shall be placed in alternate areas, as defined by the construction and control joints indicated on the design drawings. A minimum of 3 days shall elapse between placement of adjacent sections.

4. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Should any segregation occur, the concrete shall be remixed before it is placed. Concrete shall be placed in the forms in horizontal layers not over 1 to 2 feet thick. Concrete shall not be allowed to drop freely more than 4 feet. If the free drop to the point of placement must exceed 4 feet, the Contractor shall obtain the approval of the Engineer for the proposed method of depositing the concrete. The concrete shall not be required to flow over distances greater than 3 feet in any direction in the forms or on the ground, unless otherwise permitted by the Engineer.
5. Do not place concrete for supported elements until concrete previously placed in the supporting element (column, slabs and/or walls) has reached 70% of its 28 day strength.
6. Unless otherwise noted, the work begun on any day shall be completed in daylight of the same day.
7. "Cold Joints" are to be avoided, but if they occur, they are to be treated as bonded construction joints.
8. Chutes for conveying concrete shall be of U-shaped design and sized to insure a continuous flow of concrete. Flat (coal) chutes shall not be employed. Chutes shall be metal or metal-lined, and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45 degrees and shall be such as to prevent segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than 5 feet above the surface of the concrete in the forms, a spout shall be used and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally more than 5 feet.
9. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cubic yards of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.
10. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be wet, tamped, and rolled until thoroughly compacted prior to

placing

concrete.

11. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the drawings or approved by the Engineer.
12. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each run, and the water and debris shall not be discharged inside the form.

**B. CONCRETE PLACING DURING COLD WEATHER:**

1. For this Specification, cold weather is defined as a period when for more than three successive days, the average daily outdoor temperature drops below 40 degrees F. The average daily temperature shall be calculated as the average of the highest and the lowest temperature during the period from midnight to midnight
2. Concrete placed during cold weather shall be batched, delivered, placed, cured and protected to compliance with the recommendations of ACI 306R and the additional requirements of this section.
3. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when concrete is mixed, placed, or cured when the mean daily temperature is below 40oF, or is expected to fall to below 40 degrees F, within 72 hours, and the concrete after placing shall be protected by covering, heat, or both. No accelerant shall be used to prevent freezing.
4. The temperature of concrete surfaces shall not be permitted to drop below 50 degrees F. for at least 7 days after placement of the concrete.
5. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval and direction of the Engineer. All procedures shall be in accordance with provisions of ACI 306. Cold weather concreting shall not begin until the work plan is acceptable to the Engineer.

**C. CONCRETE PLACING DURING HOT WEATHER:**

1. For this Specification, hot weather is defined as any combination of high air temperatures, low relative humidity, and wind velocity which produces a rate of evaporation as estimated in ACI 305R, approaching or exceeding 0.2 pounds per square foot per hour.
2. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing shall be sprinkled with cold water.



The Contractor shall make every effort to minimize delays which will result in excessive mixing of the concrete after arrival on the job.

3. During periods of excessively hot weather (90 degrees F, or above) ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90 degrees F, when ready for placement will not be acceptable, and will be rejected.
4. Temperature records shall be maintained throughout the period of hot weather giving air temperature, general weather conditions (calm, windy, clear, cloudy, etc.) and relative humidity. The record shall include checks on temperature of concrete as delivered and after placing in forms. Data should be correlated with the progress of the work so that conditions surrounding the construction of any part of the structure can be ascertained.
5. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel
6. Temperature will not exceed the ambient air temperature immediately before embedment in concrete.
7. Wet form, particularly metal deck, before placing concrete.
8. Keep permanent temperature record showing date and outside temperature for concreting operations. Thermometer reading shall be taken at start of work in morning, at noon, and again late in afternoon., Locations of concrete placed during such periods shall likewise be recorded, in such manner as to show any effect temperatures may have had on construction. Copies of temperature record shall be distributed daily to Owner.

#### D. COMPACTING

1. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce the required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cu. yd. of concrete per hour. In addition, one spare vibrator in operating condition shall be on the site.
2. A minimum frequency of 7000 revolutions per minute is required for mechanical vibrators. Do not use vibrators to transport concrete within forms. Insert vibrators and withdraw at points from 18-in to 30-in apart. At each insertion,

vibrate sufficiently to consolidate concrete, generally from five to 15 seconds. Do not over vibrate so as to segregate.

E. CURING:

1. Immediately after placement, concrete shall be protected from premature drying extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. All materials and equipment needed for adequate curing and protection shall be available and at the placement prior to placing concrete. No fire or excessive heat shall be permitted near or in direct contact with the concrete at any time. Concrete curing shall be performed as specified in ACI 301 and as stated herein. All curing procedures shall have prior approval of the Engineer.
2. Curing procedure shall be continued for at least 7 days.
  - a. Moisture loss from surface placed against metal or wood forms shall be minimized by keeping forms wet until removal.
  - b. Curing shall be continued for at least 7 days. When forms are removed during the curing period, surfaces shall be cured by spraying or by the use of a curing compound as previously specified.
  - c. Surfaces shall be protected from traffic or damage until surfaces have hardened sufficiently. If necessary, 1/2-inch thick plywood sheets shall be used to protect the exposed surface.

F. FINISHING OF FORMED SURFACES:

1. Schedule of Finishes:
  - a. Concrete for the Project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section.
  - b. Finishes to the base concrete for the following conditions shall be finished as noted and as further specified herein:
    - i. Exposed exterior formed concrete, except exposed slabs and walking surfaces – Rubbed finish.
    - ii. Concrete to receive chemical hardener – Light broom finish, non slip, except at electrical rooms provide wood float, non slip.
    - iii. Exterior concrete slab, stairs and other horizontal areas -- Broomed finish, non-slip.
    - iv. Walls and vertical surfaces in process tanks and basins – Off form finish.

- v. Concrete receiving sheet membrane waterproofing – cleared of laitance and foreign materials and rubbed at vertical surfaces, steel trowel finish at horizontal/sloping surfaces.
  - vi. Concrete to receive paint – Rubbed finish
  - vii. Top of curbs and pads – Steel troweled finish
2. Concrete shall not be stripped before the concrete has been cured and attained required strength.
  3. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications or corners when removing the forms or doing any other work adjacent thereto.
  4. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.
  5. Off-Form Finish – Fins and other projections shall be removed, dull of and sharpen edges, and tie cones and defects filled.
  6. Rubbed Finish
    - a. Immediately upon stripping forms and before concrete has changed in color, all fins shall be carefully removed with a hammer. While the wall is still damp apply a thin coat of medium consistency neat cement slurry by means of bristle brushes to provide a bonding coat with all pits, air holes or blemishes in the parent concrete; avoid coating large areas of the finished surface with this slurry
    - b. Before the slurry has dried or changed color, apply a dry (almost crumbly) grout consisting of one volume cement to 1-1/2 volumes of clean masonry sand having a fineness modulus of approximately 2.25 and complying with the gradation requirements of the ASTM for such a material. Grout shall be uniformly applied by means of damp (neither dripping wet nor dry) pads of coarse burlap approximately 6-in square used as a float. Grout shall be well scrubbed into the pits and air holes to provide a dense mortar in the imperfections to be patched.
    - c. Allow the mortar to partially harden for one or two hours depending upon the weather. If the air is hot and dry, keep the wall damp during this period using a fine fog spray. When the grout has hardened sufficiently so it can be scraped from the surface with the perpendicular edge of a steel trowel without damaging the grout in the small pits or holes, cut off all that can be removed with a trowel. Grout allowed to remain on the wall to long will get too hard and will be difficult to remove.
    - d. Allow the surface to dry thoroughly and rub it vigorously with clean dry burlap to completely remove any dried grout. No visible film of grout

should remain after this rubbing. The entire cleaning operation for any area must be completed the day it is started. Do not leave grout on surfaces overnight. Allow sufficient time for grout to dry after it has been cut with the trowel so it can be wiped off clean with the burlap.

- e. On the day following the repair of pits, air holes and blemishes, the walls again shall be wiped off clean with dry, used pieces of burlap containing old hardened mortar which will act as a mild-abrasive. After this treatment, there shall be no built-up firm remaining on the parent surface. If, however, such is present a fine abrasive stone shall be used to remove all such material without breaking through the surface film of the original concrete. Such scrubbing shall be light and sufficient only to remove excess material without working up a lather or mortar or change the texture of the concrete. Rubbing shall be performed while the surface is wet using a carborundum or cement sand brick, to achieve a smooth uniform, even textured finish. Patched and chipped areas shall be blended to match as closely as possible the appearance of the rest of the surface. No cement wash or plastering will be permitted, and no mortar shall be used except as required above.
- f. A thorough wash-down with stiff bristle brushes shall follow the final bagging or stoning operation in order that no extraneous materials remain on the surface of the wall. The wall shall be sprayed with a fine fog spray periodically to maintain a continually damp condition for at least 3 days after the application of the repair grout.
- g. In addition to scraping, interior concrete surfaces which will be exposed to view and concrete surfaces which are to be prepared and painted as specified in Section 09900, PAINTING, shall receive a smooth rubbed finish, in accordance with ACI 301 and as described below.
- h. Form tie holes and other voids and faults shall be patched. Voids shall be cleaned out, roughened, thoroughly wetted, coated with neat cement paste, and filled with mortar of cement and sand in the same proportions, materials, and color as used in the concrete. The surface of the patch shall be flush with the surrounding surface after finishing operations are complete. Surface shall be kept continuously damp until patches are firm enough to be rubbed without damage.

G. TESTING:

- 1. Concrete inspection and testing shall be performed by an independent inspection laboratory, engaged and paid for by the Contractor. The Engineer shall approve the inspection laboratory before concrete work commences. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.

2. At least one slump test shall be performed from each truck load of concrete. The sample for slump shall be taken from the middle third of a truck load. Air content tests shall be made at the discretion of the Engineer. If the measured slump or air content falls outside the specified limits, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, the concrete shall be considered to have failed the requirements of the specification and shall be immediately removed from the jobsite to be discarded.
3. The Contractor shall advise the Engineer of his readiness to proceed with concrete placement at least one working day prior to each placement. The Engineer will inspect the preparations for concrete, including the preparation of previously placed concrete, the reinforcing, and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.
4. A minimum of four standard compression test cylinders shall be made and tested for each 100 cubic yards or fraction thereof for each type and design strength of concrete from each day's placement of concrete. One cylinder shall be tested at 7 days and two cylinders at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. The Engineer reserves the right to require test cylinders to be made for each truckload of concrete if the nature of the project or project experience indicates such additional tests are required for proper control of concrete quality.
5. The strength level shall be considered satisfactory so long as the averages of all sets of three consecutive strength test results equal or exceed the specified strength  $f'_c$ , and no individual strength test (average of two cylinders) result falls below the specified strength  $f'_c$  by more than 500 psi.
6. In the event the average compressive strength of the two 28 day cylinders does not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days.

H. FAILURE TO MEET REQUIREMENTS:

1. The Engineer shall have the right to reject concrete represented by low strength tests or to agree to further testing of the concrete. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected or additional tests shall be conducted shall be final. All direct and indirect costs associated with further curing and testing of the concrete shall be at the Contractor's expense.
2. If the Engineer agrees to consider further curing and/or testing of the concrete before making a final decision, the Contractor shall submit a detailed plan to the Engineer, including proposed criteria for acceptance of the concrete. The plan may include additional curing of the concrete, drilling and testing of cores, load testing of the structure, or a combination.

3. If additional curing is permitted before further inspection and testing, the Contractor shall provide any necessary materials and labor to further cure the suspect concrete.
4. If drilling and testing of cores is permitted, the Contractor shall be responsible for obtaining the cores, including provision of ladders, scaffolding, and such incidental equipment as may be required. If additional curing is permitted, cores shall be drilled after the curing period, and shall be in accordance with ASTM Methods C39 and C42. The Contractor shall repair all core holes to the satisfaction of the Engineer.
5. The burden of proof, including, but not limited to the work of cutting and testing the cores, inspection, evaluation, engineering, repair of the holes, or removal and replacement of the concrete in question, and all associated costs therefore, shall be at the expense of the Contractor.
6. If load testing of the concrete is permitted, and if not otherwise indicated, slabs or beams under load test shall be loaded with their own weights plus a superimposed load of 2 times the design live load. The load shall be applied uniformly over the portion being tested in the approved manner and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period, does not exceed the following value:

$$D \text{ equals } 0.001 (L \times L)/t$$

in which "L" is span in feet, "t" is depth of slab, or beam in inches. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, the slab, or beam under test recovers at least 75 percent of the observed deflection.

7. If the suspect concrete still fails to meet specification requirements, the Engineer shall have the right to reject the concrete, have it removed and replaced, in accordance with paragraph 5 above, or to require mechanical strengthening of the concrete to satisfy project requirements. The Contractor shall submit a removal and replacement plan for review by the Engineer.

END OF SECTION

## SECTION 09900

### PAINTING AND COATING

#### PART 1 - GENERAL

##### 1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

##### 1.2 DESCRIPTION OF WORK

- B. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
  - 1. Field painting of exposed interior items and surfaces.
  - 2. Field painting of exposed exterior items and surfaces.
  - 3. Surface preparation for painting.
- C. Alternates: Not Applicable.
- D. Items To Be Installed Only: Not Applicable.
- E. Items To Be Furnished Only: Not Applicable.

##### 1.2 DEFINITIONS AND EXTENT

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
  - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
  - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
  - 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
  - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.
- B. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
  - 1. Priming and surface treatment specified in other Sections.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not

specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Engineer will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
1. Prefinished items include the following factory-finished components:
    - a. Finished mechanical and electrical equipment.
    - b. Light fixtures.
  2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Foundation spaces.
    - b. Pipe spaces.
    - c. Duct shafts.
  3. Finished metal surfaces include the following:
    - a. Anodized aluminum.
    - b. Stainless steel.
    - c. Bronze and brass.
  4. Operating parts include moving parts of operating equipment and the following:
    - d. Valve and damper operators.
    - e. Linkages.
    - f. Sensing devices.
    - g. Motor and fan shafts.
  5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

### 1.3 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.



1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
3. Submit two eight inch by 12 inch Samples for each type of finish coating for Engineer's review of color and texture only.

C. Qualification Data: For Applicator.

#### 1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
- C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
  1. Engineer will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
    - a. Wall Surfaces: Provide samples on at least 50 sq. ft.
  2. Small Areas and Items: Engineer will designate items or areas required. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
    - a. After finishes are accepted, Engineer will use the room or surface to evaluate coating systems of a similar nature.
  3. Final approval of colors will be from benchmark samples.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
  1. Product name or title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for pigment and vehicle constituents.
  5. Thinning instructions.

6. Application instructions.
  7. Color name and number.
  8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

## 1.6 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
  1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work are listed in the Finish Schedule at the end of this Section.

### 2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
  - a. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  - b. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
  - a. Notify Engineer about anticipated problems when using the materials specified over substrates primed by others.

### 3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
  1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
  1. Provide barrier coats over incompatible primers or remove and reprime.

2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
    - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
  3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
    - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
    - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
  4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
  2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  3. Provide finish coats that are compatible with primers used.
  4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
  5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
  7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  8. Finish doors on tops, bottoms, and side edges the same as exterior faces.
  9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  2. Omit primer over metal surfaces that have been shop primed and touchup painted.
  3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
  2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.

3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
  1. Uninsulated metal piping.
  2. Uninsulated plastic piping.
  3. Pipe hangers and supports.
  4. Tanks that do not have factory-applied final finishes.
  5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
  6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
  7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- G. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- H. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
  1. Provide satin finish for final coats.
- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
  1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

### 3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Engineer.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
  1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

### 3.7 PAINT SCHEDULE

- A. Schedule: Provide products and number of coats specified. Use of manufacturer's proprietary product names to designate colors, materials, generic class, standard of quality and performance criteria and is not intended to imply that products named are required to be used to the exclusion of equivalent performing products of other manufacturers.
- B. Metal Steel Pipes:
  1. Modified Polyamine Epoxy system, interior, MPI #
    - a. Prime Coat: Primer sealer, alkyd, interior, MPI #45
      - a. Tnemec Pota-Pox Series 20HS @ 5.0-7.0 mils DFT.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
      - a. Tnemec Epoxoline Series 22 @ 18.0-20.0 mils DFT.
    - c. Topcoat: Latex, interior, (MPI Gloss Level 2), MPI #44.

a. Tnemec Epoxoline Series 22 @ 18.0-20.0 mils DFT.

d. Color System Table for Material Contents Identification for Pipes:

PROCESS FLOW STREAM		
Material	Generic Color	Color Identification
Raw Water	olive green	110GN Clover
Washwater Supply	light blue	25BL Fountainbleu
Finished or Potable Water	dark blue	11SF Safety Blue
Backwash Waste	light brown	68BR Twine

C. Galvanized-Metal Substrates:

1. Pigmented Polyurethane over Epoxy Primer System MPI EXT 5.3L:

a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.

b. Intermediate Coat: Polyurethane, two components, pigmented, gloss matching topcoat.

c. Topcoat: Polyurethane, two components, pigmented, gloss (MPI Gloss Level 5), MPI #72.

D. MECHANICAL WORK:

1. Paint all exposed items throughout the project except factory finished items with factory-applied baked enamel finishes which occur in mechanical rooms or areas, and excepting chrome or nickel plating, stainless steel, and aluminum other than mill finished. Paint all exposed ductwork and inner portion of all ductwork: Same as specified for other interior metals, hereinabove.



### 3.8 PIPING IDENTIFICATION

- A. After painting, piping shall be identified by stenciling using the same specified paint as used on the pipes. Stenciling shall be of wording and color selected by the Engineer and sized as follows:

Outside Diameter of Pipe or Covering	Size of Letters
3/4 inch to 1-1/4 inch	1/2 inch
1-1/2 inch to 2 inch	3/4 inch
2-1/2 inch to 6 inch	1-1/4 inch
8 inch to 10 inch	2-1/2 inch
Over 10 inch	3-1/2 inch

- B. Arrows shall indicate direction of flows. Where "a" is equal to 3/4 of the outside diameter of pipe or covering, the arrow shaft shall be 2 "a" long by 3/8 "a" wide. The arrowhead shall be an equilateral triangle with sides equal to "a". Maximum "a" dimension shall be 6 inches.
- C. Where pipe passes through a wall, use pipe markers and directional arrows on each side of the wall.

END OF SECTION 09900



## SECTION 11200

### INTERIOR PROCESS PIPING AND VALVES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. The work covered under this Section of the Specifications includes the furnishing of all plant, labor, equipment, appliances, and materials, and in performing all operations in connection with the furnishing, installation, and testing of interior process piping systems, including piping, pipe fittings and specials, mechanical couplings, victaulic couplings, wall fittings, valves, flexible pipe connectors, strainers, jointing materials, pipe hangers and supports, and accessories of the various materials, sizes, classes, joints, and types, and appurtenant work, at the locations and to the general arrangements and details as indicated and/or as directed, complete in place, in accordance with the Drawings and Specifications.
- B. Related Sections:
  - 1. Division 1 – General Requirements
  - 2. Division 2 – Site Work
  - 3. Division 9 – Finishes
  - 4. Division 10 – Specialties
  - 5. Division 11 – Equipment
  - 6. Division 13 – Special Construction
  - 8. Division 16 – Electrical

##### 1.2 SUBMITTALS

- A. Submit the following in accordance with the Conditions of Contract and Division 1 Specification Sections.
- B. Shop Drawings: Include materials lists, catalog cuts, and complete specifications for all piping materials including gaskets and connections. Shop drawings for all pumps, valves, valve operators, strainers, hangers and supports, wall pipes, wall sleeves, flexible connections, hydrants, nozzles, cleanouts, and other like manufactured items. Detailed piping layout drawings of all interior and exterior piping and valves including location, type, and number of proposed pipe supports. Drawings of exterior piping shall also show the relationship between the work included in this section and that included in others where in close proximity.
- C. Operation and Maintenance Manuals: Submit materials for inclusion in Operating and Maintenance Manuals specified in Division 1.

##### 1.3 QUALITY ASSURANCE

- A. The materials and equipment covered in this specification are intended to be standard materials and equipment of proven ability as manufactured by reputable concerns.

Equipment shall be designed and constructed in accordance with the best practice of the industry and shall be installed in accordance with the manufacturer's recommendations and these Specifications. The Specifications call attention to certain features but do not purport to cover all details entering into the construction of the equipment.

#### 1.4 DESIGN CONDITIONS

- A. Setting miscellaneous material. All anchors, bolts, inserts, supports, pipe wall fittings, pipe sleeves and such other materials occurring in connection with concrete and masonry work shall be furnished and placed accurately and maintained securely in position to lines and grades at the time of concrete and masonry placement. All necessary templates shall be provided.
- B. Drawings are diagrammatic and do not attempt to show each and every offset or all fittings. All changes and adjustments to the drawing layouts as required for conformity of the work to the structures as constructed, to equipment, to approved shop drawings, or to fit work of other trades shall be as approved by the Owner, and shall be included as part of the work under this Section of the Specifications at no additional expense to the Owner.

#### 1.5 PIPE SCHEDULE

- A. Pipes, fittings and specials, appurtenances, and jointing shall be in accordance with the following schedule. This schedule is set forth as a guide as to types of materials and jointing required. The lack of mention of any specific pipe shall not relieve the Contractor from the responsibility of furnishing and installing all piping as required or directed for a complete job. The schedule indicates the types of pipe required for the principal piping systems included under this Section of the Specifications and is presented herein for convenience of references for the Contractor.

PLANT PIPING SYSTEM	PIPE MATERIAL AND JOINTING
Raw/Finished Water	Flanged D.I. pipe, D.I. fittings and specials; pipe, fittings, and specials to be cement-lined; thickness class as specified herein.
Sodium Hydroxide Chemical Feed System	304 Stainless Steel
Sodium Hydroxide, Sodium Hypochlorite, and Corrosion Control Chemical Feed Systems	High chemical resistance, flexible braid-reinforced PVC tubing; high chemical resistance, normal impact Schedule 80 Type I PVC piping; fittings, injection-molded, high chemical resistance, normal impact, for use with Type I PVC Schedule 80 pipe, solvent weld joint
Analyzers	Polyethylene tubing; Schedule 40 PVC Piping and Fittings
Gauge and Valve Connections Finished Water (100') Sample Line Plant Service Water Analyzers Sample Taps	Type L Copper

## PART 2 - PRODUCTS

### 2.1 PIPES

- A. Ductile Iron (DI) Pipe and Pipe Fittings. Flanged ductile iron pipe shall be classified by Underwriters Laboratories Inc., in accordance with ANSI/AWWA A21.15/C115.
1. Ductile iron pipe with screwed-on flanges shall be centrifugally cast pipe conforming to ANSI Specification A-21.51 of latest editions. Flanges for flanged pipe shall conform to ANSI Specifications B16.1, latest edition, for American 125 Standard and in addition they shall have long hubs. After flanges have been screwed onto the pipe the face of the flange and end of the pipe shall be re-faced together in the shop and the flange shall be sealed with epoxy compound to prevent corrosion of threads from the outside. Flanges shall be faced and drilled to American 125 Standard and to match the facing and drilling of the equipment, valves and to such other items to which they are attached. Ends of pipe connecting to flexible mechanical couplings shall be suitable for and properly prepared for making the joint with the flexible mechanical coupling. Pipe shall be lined as specified herein. All interior ductile iron pipe shall be a minimum of Class 53.
  2. Ductile iron pipe with mechanical grooved couplings shall be centrifugally cast pipe conforming to AWWA C606 of latest revision. The pipe shall be

radius cut grooved conforming to Victaulic Company of American's specifications for rigid joints. Flexible joints may be used to design considerations, as shown on drawings or detailed elsewhere in these specifications. Installation shall be in accordance with Victaulic Company of American's recommendations. Grooving dimensions are the same for any one pipe OD regardless of pipe class and pressure. The outside surface of pipe between the groove and pipe end must be smooth and free from deep pits or swells to provide leak-tight seat for the Victaulic gasket. All rust, loose scale, oil, grease and dirt shall be removed. Penned surfaces may require corrective action in order to provide leak-tight gasket seal.

3. Ductile iron or cast iron flanged joint fittings shall be of the types indicated or as required and approved, and shall conform to the requirements of ANSI Specifications A21.10, latest edition, Class 250. Flanges shall be cast integral with the pipe fittings and specials and shall be faced and drilled in accordance with ANSI Specifications B 16.1, latest edition, for American 125 Standard, and facing and drilling of all flanges shall match that of the equipment, valves, and such other items to-which they are attached. Blank flanges shall be provided as required. Flanged fittings not available under ANSI Specification 21.10 shall be provided as required and shall conform to the application ANSI Specifications B 16.1 or B 16.2. Pipe fittings and specials shall be lined as specified herein. Pipe fittings, specials and adapters shall be of the sizes, dimensions and types as indicated, as specified, as required for the proper fitting of the completed work, and as approved by the Owner.
4. Fittings for mechanical grooved pipe shall conform to requirements of ANSI Specification A-21.10 with the exception of the end preparation. The end preparation shall be radius cut grooved conforming to Victaulic, Company of America's recommendations for rigid joints. Coupling housings shall be ductile iron conforming to the requirements of ASTM Specification A-536. Sizes 3-inches through 12-inches shall be of two segments; sizes 14-inches and larger shall be four or more segments. Couplings shall be Style 31 as manufactured by Victaulic, or approved equal. Lightly coat pipe ends and all gasket surfaces with Victaulic lubricant or other non petroleum base lubricant. Bolts and nuts shall be carbon steel heat treated and plated, conforming to ASTM Specification A- 183 and A-449, minimum tensile I 10,000 psi. Bolts shall be of oval neck, track head design. Gaskets shall be of the mechanical grooved coupling design with short center leg (FlushSeal® design) to bridge pipe ends, and shall have properties as designated by ASTM Specification D-2000. Such gaskets shall be suitable for the required service. Victaulic Style 341 transition flanges shall be used for direct connection of 125 pounds cast iron flanged valves, pumps or other equipment, directly to grooved pipe or fittings. Victaulic Style 341. Transition flanges shall ductile iron conforming to the requirements of ASTM Specification A-536. Gaskets shall have properties as designated by ASTM Specification D-2000 and shall be suitable for the required service. Victaulic Style 307 transition couplings shall be used for transitioning between IPS steel pipe and AWWA ductile iron sized pipe. Couplings shall consist of two ASTM A536 ductile iron housings, pressure-responsive, synthetic rubber FlushSeal® gasket (grade to

suit the intended service) having properties as designated by ASTM Specification D-2000, and plated steel bolts and nuts conforming to ASTM A 183 and A 449.

5. Cement-mortar linings: ductile iron pipe, cast iron and ductile iron pipe fittings and specials, where indicated, shall be double thick cement-mortar-lined in accordance with ANSI Specification A 21.4. Thickness of the mortar lining shall be 1/8-inch for pipe 12-inches and smaller and 3/16-inch for pipe larger than 12-inches.
6. Exterior Coating: The exterior surfaces of all other pipe and fittings shall be thoroughly cleaned and given one shop coat of manufacturer's recommended primer. The coating used shall be compatible with the coats to be field applied. The shop coat shall be applied in accordance with the paint manufacturer's recommendations.
7. Ductile iron pipe, cast iron or ductile iron pipe fittings and specials shall have cast upon them the class, thickness designation and initials of the manufacturer.
8. Pipe fittings with integrally cast bases shall be provided where indicated and as directed.
9. All flanged joints for ductile iron pipe shall be made with bolts or bolt studs with a nut on each end and SBR rubber gaskets extending at least to the inside of the bolts. SBR rubber gaskets shall conform to AWWA C111 latest revision. Bolts and nuts shall be carbon steel. Bolt studs and nuts shall be of the same quality as machine bolts. After fastening nuts to bolts or threaded rods, the threads of the bolt/rod shall extend a minimum of ½ inch outward from the face of the nut. A sample of the gaskets shall be submitted to the Engineer for approval.
10. Grooved joint piping systems shall be installed in accordance with the manufacturer's (Victaulic) guidelines and recommendations. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by Victaulic. Grooved end shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. A Victaulic factory-trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools and installation of grooved piping products. Factory-trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

## B. Stainless Steel Piping

1. Stainless Steel piping and tubing shall be 304L, ASTM A312/312M, seamless annealed, pickled and passivated, meeting the following thickness schedule:
  - a. Piping: 2-inch and less - Schedule 40S.
  - b. Piping 2.5-inch to 8-inch - Schedule 10S.
  - c. Tubing: Dimensions and materials shall conform to ASTM A269.
2. All piping 2-inches and larger shall be butt welded as per ASTM A403/A403A, Grade WP304L, conforming to ANSU B16.9 and MSS SP43, annealed, pickled and passivated; fitting wall thickness to match adjoining pipe; long radius elbows unless shown otherwise. At valves and equipment all piping shall be flanged.
3. All piping 1 to 1.5-inch shall be threaded forged as per ASTM A182/A182M, Grade 304L. At valves and equipment all piping shall be threaded or flanged.
4. All piping  $\frac{3}{4}$ -inch or smaller shall be threaded forged as per ASTM A182/A182M, Grade F304. At valves and equipment piping shall be either threaded or flanged.
5. Accessories:
  - a. All flanges shall be forged, ASTM A182/A182A, Grade F304L, Class 150 or Class 300, slip on welding neck, 1/16-inch raised face, ANSI B16.5 standard.
  - b. All gaskets for chemical service shall be EPDM.
  - c. All bolts shall be Type 316 Grade B8M hex head bolts with Grade 8M hex head nuts for general conditions of service. In corrosive environments or applications, Type 304 stainless steel bolts Grade B8 with copper-silicon hex head nuts ASTM B98 Grade A shall be used.

## C. Plastic Pipe and Fittings

1. Unplasticized polyvinylchloride (PVC) pipe and fittings shall be Type 1, high chemical resistance, normal impact, Schedule 80 pipe made of virgin polyvinylchloride and conforming to ASTM D 1785 latest edition.
2. Unplasticized polyvinylchloride (PVC) pipe and fittings shall be Type 1, high chemical resistance, normal impact, Schedule 40 pipe made of white or clear virgin polyvinylchloride and conforming to ASTM D 1784 latest edition.
3. Polyethylene tubing shall be clear and rated at 150 psi, 80°F.
4. Fittings used in chemical feed systems shall contain no Viton parts or components.



5. Pipe fittings shall be of the same material and shall be of the proper classification and wall thickness for use with Schedule 80 pipe, Schedule 40 pipe, or polyethylene tubing. PVC joints in piping shall be solvent weld connections. Tubing connectors/adaptors for polyethylene tubing shall be PVC. A sufficient number of unions and tubing connectors/adaptors shall be provided to allow for convenient removal of piping.
6. Connections to pipe of other materials, connections to equipment, and connections at such other locations, as indicated or directed, shall be made with flanges. All flanges shall be 150 pound pipe flanges and flanged connections shall be made using SBR rubber gaskets and carbon steel bolts and nuts. SBR rubber gaskets shall conform to AWWA C111 latest revision. Flanges shall be faced and drilled to American 125 Standard and as required to match the facing and drilling of the flanges to which they are to be connected.
7. Tubing Connection System: Adapters shall be supplied to connect 3/8" braided tubing to 1/2" PVC piping for chemical feed piping as shown on the Contract Drawings. Tubing shall be secured to the PVC pipe using a coupling nut, ferrule, o-ring, and threaded fitting. Hose clamps will not be accepted. The adapter shall be constructed of PVC. Tubing socket adapter shall be manufactured by LMI or Engineer approved equal.

D. Braid-Reinforced Polyvinyl Chloride (PVC) Tubing

1. Polyvinyl chloride clear embedded braid tubing and insert fittings shall be suitable for 150 psi service. Tubing shall be FDA-approved in accordance with CFR 21 for food packaging and NSF 61 approved. Tubing that becomes kinked during handling or installation shall not be used.

E. Copper Piping: Copper Piping shall be of the thickness specified herein or as shown on the drawings, and shall be of the longest lengths commercially available.

1. Copper pipe shall conform to ASTM B-42.
2. Fittings shall be cast bronze for copper pipe and cast bronze or copper streamlined fittings for copper tubing conforming to ASTM B-30 UNS Alloy No. C83800.
3. Unions shall be bronze with ground joints and shall be semi-finished.
4. Joints for copper fittings shall be made with solder composed of 95 percent tin and 5 percent antimony.
5. Contractor shall provide copper drain lines for air/vacuum and air release valves.

## 2.2 WALL SLEEVES

- A. Cast iron wall sleeves shall be provided for all pipes passing through reinforced floors, and brick or concrete masonry unit walls, except manholes. The Contractor shall be responsible for having wall sleeves readily available and tightly secured in the form work at time of concrete placement.
- B. Cast iron wall sleeves shall be standard type, Class 250 with integrally cast wall flange. The wall sleeves shall be of the dimensions required and as directed with ends flush with both faces of the wall and for proper fitting of the carrying pipe through wall sleeve with suitable annular space. Cast iron wall sleeves shall be of approved type, dimension and wall thicknesses.
- C. For pipe penetrations through existing reinforced concrete floors, and wall brick or concrete and masonry unit walls, Contractor shall core hole through concrete of sufficient of diameter for pipe and annular space to accommodate seal. Cast-iron wall sleeves shall not be used for penetrations through existing concrete or brick walls or floors.
- D. The annular space created by the wall sleeve and the pipe or the existing concrete and the piping shall be positively sealed with "Link Seal", manufactured by Thunderline Corporation, or an approved equal. Seals shall be the modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. Links shall be loosely assembled annular with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assemblies positioned in the annular space, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely watertight seal between the pipe and wall opening. The seal shall be constructed so as to provide electrical insulation between the pipe and wall, thus reducing chances of cathodic reaction between these two members. Where the wall sleeve penetrates a wall between a tank and an interior room shall have link seals on both the interior and exterior faces of the wall. All wall sleeves above this elevation shall have link seals on the interior wall only.
- E. The Contractor shall determine the required inside diameter of each individual wall opening or sleeve before ordering, fabricating or installing the seals. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and Link-Seal to assure a water-tight joint.
- F. The Contractor shall be familiar with the installation of the seals according to the manufacturers' instruction bulletin which illustrates the proper procedure for installing and tightening the seal to provide a water-tight pipe penetration.
- G. Wall and/or floor sleeves with closure for which the above sleeves are not suited as described shall be made by means of a sleeve capable of being bolted directly to the formwork to prevent misalignment. Seal of the annular space between the carrier pipe and the sleeve shall be by means of a confined rubber gasket and capable of withstanding 350 psi. Sleeve shall be manufactured from Ductile Iron with an integrally cast water-stop of 1/2 - inch minimum thickness and 2 1/2 inches minimum height. Mechanical joint gaskets shall be EPDM. Wall sleeves shall be Omni Sleeve, or approved equal.

2.3 WALL PIPES

- A. Wall pipes shall be used where pipe of sizes 4-inch and larger penetrates structure walls and at other locations shown on the drawings. Wall pipes shall be of ANSI 21.51 ductile iron pipe of ANSI 21.50 thickness class 53 as a minimum.
- B. Wall pipe shall have a cast central fin of minimum 1/2 in. thickness and 1-1/2 in. to 2 in. high at the midpoint of the wall. Joints shall be ANSI A21.11 mechanical joint for the external joint and ANSI A21.15 flange joint for the interior joint. Flanges, facing, and drilling shall conform to ANSI B16.1, Class 125. Where flanges are flush with the structure wall, they shall be drilled and tapped for studs.
- C. Wall pipes shall be double cement lined and coated with bituminous seal coating conforming to ANSI B21.4.

2.4 EXPANSION JOINTS

- A. Provide, where indicated on the drawings, specified or detailed, expansion joints of the single arch, rubber type for equipment and piping.
- B. Flexibility capacity (minimum), in inches or degrees,

Nom. Dia (in)	Axial Comp.	Axial Ext.	Lateral Deflection	Torsional Deflection	Angular Deflection
1-3	7/16	1/4	1/2	3	13
4-6	7/16	1/4	1/2	3	8
8-18	11/16	3/8	1/2	2	3

- C. Provide joints of pressure ratings as follows:
  - 1. Plant water lines, water lines - minimum 250 psi rating
- D. The temperature rating of the expansion joints shall be minimum 200 deg. F for water service.
- E. Expansion joints installed on solids laden lines shall be provided with filled arches. Movement capabilities of the filled arch joints shall be at least 50 percent of those hereinbefore specified for the unfilled arch joint.
- F. Construction for service other than chlorine solution
  - 1. Joint consists of arched body with steel retaining rings. Body wraps around retaining ring to act as flange face.
  - 2. Body – Water Service
    - a. Inner tube: Neoprene

- b. Reinforcement: Bonded polyester/neoprene plies, unexposed to atmosphere.
    - c. Outer cover: Hypalon coated neoprene
  - 3. Retaining rings: 304 stainless steel or hot-dipped galvanized steel, unless otherwise approved.
  - 4. The temperature rating of the joint shall be as noted above.
  - 5. Manufacturers
    - a. General Rubber Corp., S. Hackensack, NJ
    - b. Mercer Rubber Co., Toledo, OH
    - c. or Engineer approved equal
- G. Refer to Section 13215 – Cross-Linked Polyethylene Storage Tanks for chemical feed tank flexible connection/expansion joints.

## 2.5 FLANGED COUPLING ADAPTERS

- A. Flanged coupling adapter for jointing of plain ends of ductile iron pipe to flanges shall be of the proper size and suitable for use on the piping on which it is installed. The coupling shall be of cast ductile iron construction. Coupling shall have a bolt circle, bolt size and spacing to ANSI 150 lb. flange drilling. The coupling gasket shall be Grade 27 Buna S - NSF 61 listed and compounded to resist water. The temperature range of the gasket shall be -20°F to 180°F. Bolts and nuts shall be low alloy steel to AWWA C111/ANSI A21.11. The coupling shall be provided with not less than four tie rods extending from flange connections on each side of the couplings. Follower rings shall be amply proportioned to take, without deformation, the strains imposed on the coupling by the installation. The ends of the pipes shall be prepared and the couplings installed in accordance with the printed recommendations of the manufacturer of the couplings. The Contractor shall be responsible for verifying dimensions of piping materials necessary to insure proper fabrication, installation and fitting of the contract work. Flange Coupling Adaptor shall be Dresser, Inc. Style 128-W with lock pins, or Engineer approved equal.

## 2.6 FILLER RINGS

- A. Filler rings of the same materials, facing and drilling as the flanges they are used with shall be provided in flanged piping where necessary and approved for the proper fitting and layout of the piping and to limit interference between wafer butterfly valves and ductile iron pipe lining or cast iron fittings.

## 2.7 TAPPED CONNECTIONS

- A. Tapped connections in pipe and fittings shall be made in such manner as to provide a water-tight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses shall not exceed that listed in the appropriate table of the Appendix to the ANSI A 21.51 based on three full threads for ductile iron.

- B. Where the size of the connection exceeds that given above for the pipe in question, a boss shall be provided on the pipe barrel, the tap shall be made in the flat part of the intersection of the run and branch of tee or cross, or the connection shall be made by means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, all as indicated or approved.
- C. All drilling and tapping of ductile iron pipe shall be done normal to the longitudinal axis of the pipe; fittings shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean cut threads of the correct size, pitch, and taper.
- D. Sample taps are to extend to the mid-point of the pipeline using injection type nozzle and corporation.

## 2.8 VALVES

- A. Gate Valves. Gate valves, two inches and smaller, shall be 125 pound bronze with solid wedge, screwed-in bonnet, inside screw, non-rising stem, and screwed ends. Gate valves larger than two inches shall be resilient wedge gate valves. Resilient wedge gate valves shall meet the most recent version of the AWWA standard specification AWWA C509.
- B. Swing Type Check Valves
  1. Check valves shall be rubber seated dampened swing check with outside counter weight and lever and shall meet the requirements of AWWA C508. The valve shall permit flow in one direction only and close tightly without slamming. The valve shall be cast iron (ASTM A126-13) with cast iron disc of similar material. The hinge shaft shall be stainless steel with disc arm and counterweight arm keyed thereon. The body seat shall be all bronze or stainless steel. The valve shall be as manufactured by GA Industries, or Engineer approved equal.
  2. The valves shall be compatible with 125 pound ANSI drilled flange. Valves shall be cleaned and shop primed on the outside with a rust inhibitive priming system.
  3. Check valves (two inches and smaller) shall be 300 pound bronze curving design with screwed-in bonnet, re-grinding bronze disc, and screwed ends. Disc shall be suspended at the top with a stainless steel shaft. All check valves shall be horizontally mounted.
- C. Bronze Ball Valves
  1. Bronze ball valves shall be of bronze construction. The shaft and packing nut shall be constructed of brass and the ball shall be constructed of hard chrome plated brass. Shaft packing shall be glass reinforced PTFE. Packing shall be

tightened by means of a gland bearing strip. Replacement of the packing shall be accomplished without removing the actuator. The handle shall be stainless steel with vinyl insulator. Ball shall have a straight-through passageway, and shall be of the full port design. Valves shall be rated for 150 psi service.

D. Cam-and-Grove Couplings

1. Cam-and-Groove hose couplings for stainless steel chemical fill pipes shall be provided where shown on the Contract drawings. The female coupling material shall be compatible with each chemical application and sized as specified on the Contract Drawings. The couplings shall be provided with a cap. The couplings shall be attached to the process piping with NPT threads. Contractor shall coordinate the coupling with the Owner and Engineer.

E. Plastic Valves

1. Polyvinylchloride (PVC) valves shall be manufactured of the same PVC Type I Grade I molding compound used for the fittings to assure proper compatibility of system components. Seats, seals and other components shall be suitable for the intended service.
2. Ball valves for PVC lines shall be true union PVC valves with fully serviceable, replaceable valve component design. Valve design shall allow for entire valve body removal by turning back the union nut at both ends of the valve without disturbing the pipe. Valves shall have self-adjusting floating teflon seats, and EPDM packing. Valves shall carry a pressure rating of 150 psi at 75 degrees F water. Valve shall be manufactured to ASTM F 1970.
3. Diaphragm valves for PVC lines shall be true union PVC valves. The valves shall come standard with position indicator, travel stop, and bonnet O-ring sealing arrangement. The valve shall be weir type with a hand wheel operator, square body/bonnet sealing design, and 1/4 turn bayonet style diaphragm/compressor connection. All PTFE diaphragms shall be 3-layer style with PTFE wetted diaphragm, PVDF gas barrier and EPDM backing cushion. The PVDF gas barrier shall be between the EPDM and PTFE layers and prevent against gas migration outside of the valve. Valves shall carry a pressure rating of 150 psi at 75 degrees F water. Valves shall be manufactured by Asahi/America Corp, or Engineer approved equal.
4. Air Release/Degassing Valve: An air release/degassing valve shall be installed on chemical transfer piping at the highest point prior to entering the day tank as shown on the Contract Drawings. The valve shall release any air built up in the pipe during chemical transfer and the outlet port being piped back to the day tank. The valve shall be constructed of PVC with a polypropylene float and EPDM seals. All wetted parts shall be compatible with its intended chemical application. Valves shall have a pressure rating of 100 psi. Air release/degassing valves shall be manufactured by Plast-O-Matic, or Engineer approved equal.

5. Ball check valves for PVC lines shall be true union with full serviceable, replaceable valve component design. Valve design shall allow for entire valve body removal by turning back the union nut at both ends of the valve without disturbing the pipe. All valve components shall be replaceable and valve shall be suitable for either horizontal or vertical installations. Valves shall have self-adjusting floating teflon seats, and EPDM packing. Valves shall carry a pressure rating of 150 psi at 75 degrees F water. Valve shall be manufactured to ASTM F 1970.
6. Strainer: Strainers shall be Y-pattern type, PVC body with EPDM seals. All materials in the strainer shall be compatible for the service intended. Strainers shall be installed so as to allow for removal of screens without disconnecting piping. Strainer shall be true-union design and constructed of transparent PVC. Standard screens shall be 20 mesh PVC. Strainer shall carry a pressure rating of 150 psi at 75 degrees F water and shall have NSF-61 Certification for use in drinking water applications. Strainer shall be manufactured by Asahi/America Corp, or Engineer approved equal.
7. Pressure Relief Valve: Pressure relief valve shall be installed on chemical piping as shown on the Contract Drawings. The valve shall release any pressure built up in the pipe and vent back to the day tank. The valve shall be constructed of PVC. All wetted parts shall be compatible with its intended chemical application. Valves shall have a pressure rating of 150 psi.

F. Stainless Steel Valves

1. Stainless steel ball valves shall be of Type 304 or 316 stainless steel construction, as shown on the Contract Drawings. Body shall be of rigid construction and symmetrically cast. The shaft and ball shall be integrally cast and shall be Type 304 or 316 stainless steel. Seats shall be recessed in a machined groove. Shaft packing shall be a braided band. Packing shall be tightened by means of a gland bearing strip. Replacement of the packing shall be accomplished without removing the actuator. Ball shall have a straight-through passageway, and shall be of the full port design. Valves shall be rated for 150 psi service. For chemical service applications, valve wetted parts shall be suited for the intended service.

G. Butterfly Valves - Water Service, Manual Actuator

1. Butterfly type valves shall be flanged cast iron, long body or short body, resilient seat, tight closure, vertical seating valves. Valves shall conform to American Water Works Association, Specification C504, latest edition, Class 150B. The Contractor shall furnish the services of a valve manufacturer's representative who shall check all valve installations and make all necessary adjustments to assure proper and satisfactory operation of the valves. All valves shall be open right and shall have a position indicator permanently cast on the valve operator. Acceptable valve manufacturers are Pratt, DeZurik, M & H, or equal.

2. Valve bodies and flanges: Laying lengths for valves shall be as given in Table 1 of AWWA C504-06. Valve bodies shall be constructed of cast iron conforming to ASTM Designation: A 126, Class B, or ASTM Designation: A 48, Class 40. Cast iron waterways surfaces shall be epoxy coated. Valve body flange drilling shall conform to ANSI Specification B 16.1, Class 125 with full through drilled holes.
3. Valve shafts shall be made of stainless steel Type 304, in accordance with Table 3 of AWWA C504.
4. Valve discs shall be of cast design. Valve disc material shall be of cast iron conforming to ASTM Designation: A 48, Class 40 or A-126, Class B with all exposed cast iron surfaces coated with an approved epoxy base coating applied to a dry film thickness of not less than 12 mils.
5. Valve seats for all valves shall be designed to provide tight shut-off at a pressure differential of 150 psi upstream, zero psi downstream. Rubber seats shall be applied to the cast iron valve disc and clamped thereon using a retaining ring and the mating seat surface shall be Type 304 stainless steel applied to the cast iron body. Subject to the review of the Engineer, the rubber seat may be molded and bonded into the valve cavity and the disc shall be of cast iron, ASTM A-126 Class B with 316 stainless steel seating edges. Valve seats, valve seat assemblies and materials shall be subject to the review of the Engineer.
6. Valve bearings shall be of the permanently self-lubricating sleeve type. Valves shall be equipped with a 2-way thrust bearing permanently set at the factory which will permit the valve to be mounted in any position. Each valve shall have a self-lubrication sleeve type bearing for the valve operator. The housing for the bearing shall be rigidly attached to the valve body. All valve bearings shall be non-metallic throughout and of approved types.
7. Shaft seals: All valves shall be provided with shaft seals designed for use by stuffing boxes with pull-down packing. Stuffing boxes shall be of cast iron conforming to ASTM Designation: A 126, Class B, with cast bronze gland assemblies and flax packing or may be the split v chevron type.
8. Manual Operators: Operators shall conform to AWWA Standard C504 and shall be designed to hold the valve in any intermediate position between full open and fully closed without creeping or fluttering. Valve operators shall be open right and of the traveling nut type, self locking without uni-directional sustained force from the valve, self lubricating, rated for operation when submerged at a water pressure of 10 psi, and shall be equipped with a position indicator. Multi-position hand-lever actuators shall be provided where indicated. The operators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chain wheels. Chainwheels shall be provided on all valve operators when the centerline of the valve is more than six (6) feet above the finished floor level.



Operator components shall withstand an input of 300 foot pounds at extreme operator position without damage.

H. Air Release Valve, ½ to 2-inches

1. Suitable for water service, automatically exhaust small amounts of entrained air that accumulates in a system. In CLOSED position, seat against resilient seat to prevent water leakage.
2. Rated 150 psi working pressure, cast iron or ductile iron body and cover, stainless steel float and trim, NPT threaded inlet and outlet, built and tested to AWWA C512. Contractor shall provide copper drain line for air release valves.
3. Manufacturers and Products:
  - a. Pipeline Air Release Valves:
    - 1) APCO Valve and Primer Corp.; 200A
    - 2) Val-Matic Valve; Model 22.4
    - 3) Or Engineer approved equal

I. Well Service Air Valve

1. Well service air valve shall be fully automatic float operated valves designed to exhaust air which is present in the pump column on pump startup and allow air to re-enter the column on pump shutdown or should a negative pressure occur. The valve design shall incorporate a throttling device providing adjustable control of the exhaust rate and allow free flow into the valve through a separate inlet port. The valve shall be manufactured and tested in accordance with AWWA C512. The valves shall be suitable for potable water service and NSF 61 certified.
2. The valve body, cover, and baffle shall be constructed of ASTM A126 Class B cast iron for Class 125 valves. The float, guide shafts, and bushings shall be constructed of Type 316 stainless steel. Non-metallic guides and bushings are not acceptable. Resilient seats shall be Buna-N.
3. Valve shall be Val-Matic Model 101ST, or Engineer approved equal.

J. Pressure Anticipator and Surge Relief Valve

A pressure relief and surge anticipator valve shall function to anticipate pressure surges and open to dissipate the surge. A high pressure relief valve shall also be provided that will open the valve if the flow is blocked by an obstruction in the line.

The valve shall be hydraulically operated, single diaphragm-actuated and globe pattern. The diaphragm assembly shall be the only moving part and shall form

a sealed chamber in the upper portion of the valve separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls.

Valve body and cover shall be made of cast ductile iron with 316 stainless steel trim.

The valve shall contain a resilient, synthetic rubber disc, with a rectangular cross-section contained on three and one-half sides by a disc retainer, forming a tight seal against a single removable seat insert. The disc guide shall be of the contoured type to permit smooth transition of flow and shall hold the disc firmly in place. The disc retainer shall be of a sturdy one-piece design capable of withstanding opening and closing shocks.

The diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the process fluid. The diaphragm must withstand a Mullins Burst Test of a minimum of 600-PSI per layer of nylon fabric and shall be cycle tested 100,000 times to insure longevity. The diaphragm shall not be used as the seating surface.

The main valve seat and the stem bearing in the valve cover shall be removable. The lower bearing of the valve stem shall be contained concentrically within the seat and shall be exposed to the flow on all sides to avoid deposits. Cover bearing, disc retainer, and seat shall be made of the same material. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline. Packing glands and/or stuffing boxes shall not be permitted.

The pressure relief pilot shall be an adjustable, spring-loaded, normally closed diaphragm control designed to permit flow when upstream pressure exceeds the control setting. The low-pressure pilot shall be an adjustable, spring-loaded, normally open diaphragm control designed to open when the sensed pressure falls below the control setting and close when pressures are normal. Pilot control sensing shall be upstream of the pilot system strainer so accurate control may be maintained if the strainer is partially blocked. A combination strainer and adjustable needle valve assembly shall also be included in the pilot system. The pilot system shall also include an inlet liquid-filled pressure gauge 0-200 psi and a valve position indicator.

The valve manufacturer shall provide a computerized cavitation chart which shows flow rate, differential pressure, percentage of valve opening, Cv factor, system velocity, and if there will be cavitation damage. The manufacturer shall submit a certification stating that the supplied pressure relief and surge anticipator valve is suitable for the intended service. A direct factory representative shall be made available for start-up service, inspection and necessary adjustments.

The valve shall be Cla-Val Model 52-01KCH, or Engineer approved equal.

## 2.9 VALVE TAGS

- A. All valves in piping except individual valves provided with equipment shall be tagged with an aluminum or brass disc, wired to the valve, die-stamped with identifying numbers or letters.
- B. A flow diagram, identifying number and duty of each tagged valve, framed under safety glass, shall be furnished and mounted by the Contractor in the Electrical room, at major equipment, or as directed by the Engineer.

## 2.10 PIPE SUPPORT SYSTEMS

- A. All supports and parts required for the installation of the piping systems shall conform to the requirements of Chapter 1, Section 6 of the ANSI Code for Pressure Piping (B-31.1), except as modified and supplemented by the requirements set forth herein. All piping shall be supported in such a manner to fulfill this specification. Pipe supports and restraints shall be adequate for the maximum test pressure specified herein or 1.5 times the apparent working pressure, whichever is greater. General contractor shall provide and install all pipe supports for piping, valves, equipment, and ancillary items described within Division 11.
  - 1. Supporting appurtenances shall be arranged to prevent undue stress on equipment to which piping is connected. Supporting system shall be arranged without causing damaging deflection to the support member. Supporting appurtenances shall provide the desired pitch, as specified or required, for proper drainage of the piping. The pipe suspension shall prevent excessive stress, excessive variation in supporting force, and possible resonance with imposed vibration while the system is in operation. Supporting appurtenances, when used with copper piping, shall be copper, bronze or PVC dipped galvanized steel.
  - 2. All piping shall be supported independent of the equipment to which it is connected. All equipment shall be removable without needing temporary supports for adjacent piping. Any anchors for all supporting appurtenances shall be drilled expansion bolt type, power driven stud anchors are not acceptable. Expansion bolts shall be stainless steel, similar and/or equal to Kwik-Bolt.
  - 3. All metallic supporting appurtenances, except those used for copper piping, and as otherwise noted, shall be galvanized conforming to ASTM A-153 for threaded items, and ASTM A-123 for all other items. Supporting appurtenances in the high humidity areas shall be stainless steel. Normal humidity service shall be defined as all spaces where there are no water-containing open tanks or channels. High humidity service shall be defined as any spaces near open water-containing tanks or channels. Hangers shall not become disengaged by movements of the supported pipe. Lock nuts shall be used on all hangers. All piping systems shall be supported by hangers that can vertically adjust for the leveling of lines after piping is in place. Hanger rods shall be subject to tensile loading only. At hanger locations

where lateral or axial movement is anticipated, suitable linkage shall be provided to permit swing. All hanger rods, except those that are stainless steel, shall conform to ASTM A-575. Hanger rod diameters shall be as recommended by pipe hanger manufacturers for the type of pipe, hanger size, and spacing used.

4. Piping shall be supported according to the Spacing Schedule below, and/or the MSS Standard Practice SP-69, (Manufacturers Standardization Society of the Valve and Fitting Industry), whichever spacing is closer. A support shall also be located within four inches of each side of all fittings and valves. Vertical runs of pipe shall be supported independently of the connected horizontal runs. All vertical pipes shall be supported at each floor or at intervals not greater than ten feet, by approved pipe collars, clamps, brackets or wall rests. Hangers shall be placed on each side of a flexible coupling, as close to the coupling as possible. At expansion joints, hangers supporting the flexible couplings shall be placed on either side of the joint. Hangers shall prevent transverse movement.

SPACING SCHEDULE\*, \*\*

PIPE SIZE (INCH)	STEEL PIPE SCH. 20-80 (FEET)	STAINLESS STEEL (FEET)	COPPER PIPING (FEET)	DUCTILE IRON PIPE (FEET)	C/PVC PIPE (FEET)
½	5	-	5	-	3
¾	6	-	6	-	3
1	7	-	6	-	3.5
1 ½	9	-	8	-	3.5
2	10	10	9	6	4
2 ½	11	-	10	-	4.5
3	12	-	10	6.5	4.5
3 ½	13	-	11	-	-
4	14	10	12	8.5	5
6	17	10	14	9	6
8	19	10	14	10.5	6.5
10	22	10	15	12	-
12	23	10	17	13	6.5
14	-	10	-	14	-
16	-	10	-	15.5	-

\* Additional supports and restraints at bends shall be installed for all pump system piping as necessary to prevent deformation and movement of the pipe under maximum flows and pressures.

\*\* C/PVC pipe spacing schedule based on uninsulated pipe carrying liquid having a specific gravity of 1.0 and a temperature of 120 degrees Fahrenheit.

5. If the pipe to be supported is not listed, then the spacing for the next smaller pipe size shall be used. There shall be a minimum of one support per pipe lay length on uninterrupted horizontal runs. This support shall be placed within one foot of the joint. If the pipe manufacturer recommends a smaller spacing interval than specified herein, then the manufacturer's spacing shall be used.
  6. All supports, saddles, bearing plates, and hangers shall provide by direct contact, a minimum of 80° support around the pipe, except as specified herein. Where continuous concrete inserts are used, the maximum concentrated load on the end two inches of inserts, with laying lengths of eight inches or longer, shall not be more than 50 percent of the maximum recommended channel loading.
- B. Concrete pipe saddles shall cradle horizontal piping when it is supported from below. Where space limitation prevents using concrete pipe saddles, steel pipe saddles shall be used.
- C. Base elbows, tees and concrete pedestals shall be provided at all vertical runs of pipe and shall be supported on a base elbow and/or concrete pedestal. All concrete supports shall be formed up to the spring line of the pipe. After completion of curing, piping shall be adjusted to the proper grade.
- D. Pipe support framing system shall be designed by a qualified engineer retained by the Contractor and installed according to the design and per pipe manufacturer's recommended procedure. Pipe support and restraint system shall be designed to support the pipe's weight, pipe reaction from the flow and lateral seismic forces stipulated in the applicable provisions of the Massachusetts State Building Code, 8th edition.
1. All pipe support and restrain framing system shall be hot dipped galvanized in conformance with ASTM A-123.
  2. All structural steel wide flanges, channel, angles and plate materials shall conform to ASTM A-36. All structural steel tubing shall conform to ASTM A-500 Grade B.
  3. Steel fasteners to conform to ASTM A-307 or A-325.
  4. Fittings shall be hot rolled steel, conforming to ASTM A-307 or ASTM A-575.
  5. All welding shall be performed by qualified welders and in conformance with applicable provisions of the AWS.
  6. When condition allows, metal framing system as manufactured by Uni-strut, Globe-Strut, Power Strut, or equal, may be used for supporting the piping system.
- E. Restraints

1. All valves and fittings shall be restrained, so that all thrusts shall be supported independent of the piping system. Thrust shall not be supported by walls unless specifically designed for and indicated on Drawings. All restraints shall conform to pipe manufacturer's recommendation.
  2. For interior piping, restraints shall be located as follows:
    - a. Anchors shall be placed so all forces will be balanced.
    - b. Tie downs shall be used to hold the pipe in position where velocity and surge forces will cause pipe movement. They shall control stress due to thermal expansion at wall pipes, sleeves and equipment.
- F. Guides shall be used to prevent transverse motion at flexible couplings used as expansion joints.
1. Tie Rods: On piping, where flexible couplings are located near fittings or valves, stainless steel tie rods shall span the coupling from the two adjacent flanges. Such restraints can be deleted at the discretion of the Engineer, if both pipe ends are anchored in a concrete structure with no fitting or valve within the span. Where the Engineer intends to have flexible couplings used as expansion couplings, tie rods may be omitted. All tie rods shall be sized, spaced and installed according to the manufacturer's recommended procedure, or as directed by the Engineer.
  2. Restrained Joints: Where indicated on Drawings, restrained joints shall be installed. Restraints shall be Megalug as manufactured by Ebaa Iron Co., or approved equal. Restraints for push-on joints shall be series 800 coverall as manufactured by Ebaa Iron Co., or equal.

#### 2.11 SIGHT FLOW INDICATORS (ROTAMETERS)

- A. Materials: Bronze body with threaded ends, tapered glass tube calibrated in GPM, stainless steel float.
- B. Performance: Rotameters shall be sized for a flow rate of 0-10 gpm.
- C. Needle valves shall be provided for each rotameter for flow adjustment.

#### 2.12 FLUSHING CONNECTIONS

- A. Flushing connections shall be provided where indicated on the Contract Drawings. Flushing connections shall be ¾" female threaded hose connection with ¾" isolation ball valve. Flushing connection shall be compatible with the intended service.

#### 2.13 CHEMICAL INJECTORS

- A. Chemical injectors shall be provided where indicated on the plans. Injectors shall be SAF-T-FLO model EB-146 (or Engineer approved equal), and shall have wetted parts constructed of PVC. Injector corporations shall be constructed of 316 stainless steel. Sodium hypochlorite injector shall be provided with duckbill tip that opens

with positive pressure and closes with negative pressure to prevent mixing of the chemical solution inside the solution tube.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Handling of Pipe. The loading, hauling, unloading and handling of pipes and appurtenances shall be accomplished without damage to same. Dropping of pipe and appurtenances directly to the ground or floor will not be permitted. Suitable buffers or runners shall be provided. The Contractor shall be liable for any damage to the pipe or appurtenances until they are accepted in the completed work. Each pipe section shall be handled into its final position only in such a manner and by such means as the Engineer approves as satisfactory, and these operations will be restricted to those considered safe for the workmen and such as to cause no injury to the pipe or to any property. As far as practicable, the Contractor shall be required to furnish slings, straps, and/or approved devices to provide satisfactory support of the pipe when it is handled.
- B. Tools for Pipe Installation. The Contractor shall furnish all tools, torque wrenches, materials and labor necessary to make the joints in pipe in strict accordance with the manufacturer's specifications. Proper and suitable tools and appliances for the safe and convenient handling and installation of pipes shall be used. The Contractor shall exercise reasonable precaution during his operation in order to avoid damaging the material. All pipes, fittings or appurtenances which are so damaged shall be replaced by him at his sole expenses.
- C. Installation. All materials and equipment shall be installed in a neat workmanlike manner, and as recommended by the manufacturer. All piping shall be installed true to line and grade and rigidly supported. Before setting wall sleeves and pipes to be cast-in-place, the Contractor shall check all plans and figures which may have a direct bearing on his pipe location and he shall be responsible for the proper location of his pipes during the construction of the buildings. All interior piping shall have sufficient number of unions or their equivalent to allow convenient disassembly and removal of piping. All valves and appurtenances shall be installed in accordance with manufacturer's directions at locations shown on the drawings. All in-line devices provided under instrumentation shall be installed as part of the work of this section.
- D. Cleaning and Plugging Pipe. The pipes and fittings shall be thoroughly cleaned before being installed and shall be kept clean until accepted in the finished work. The ends of all uncompleted lines shall be tightly closed with temporary plugs at all times when pipe installation is not in progress to prevent foreign material from entering the pipe.
- E. Screwed Connections. All threads shall be clean, machine cut, and all pipe shall be reamed before erection. Screwed joints shall be made up with good quality thread compound applied to the male thread only. After having been set up, a joint must not be backed off unless the joint is completely broken, the threads cleaned and new

compound applied. Teflon tape or teflon compound may be used for steel, polyvinyl chloride, chlorinated polyvinyl chloride and copper threaded connections.

- F. Arrangements. Except as otherwise required, changes in direction shall be made using proper fittings, and unless shown otherwise piping shall run parallel and at right angles to walls and floors. Systems shall be arranged with low points and drains to permit complete drainage of the system. Control piping may be arranged with unions or union connections at low points to permit draining. Unions or flanges shall be provided close to main pieces of equipment and in branch lines to permit ready dismantling of piping without disturbing main pipe lines or adjacent branch lines.
  - G. Penetrations. All penetrations in walls, floors and ceilings shall be sealed watertight to the satisfaction of the Engineer.
  - H. Prior to installation, protect stored valves and appurtenances from damage due to exposure to sunlight, heat, dirt, debris, freezing and thawing, vandalism, etc.
  - I. Clean all debris, dirt, gravel, etc, from inside of piping before placing valves in place.
  - J. Erect and support valves in respective positions free from distortion and strain on appurtenances during handling and installation. Inspect material for defects in workmanship and material. Clean out debris and foreign material from valve openings and seats, test operating mechanisms to check proper functioning, and check nuts and bolts for tightness. Repair, valves and other equipment which do not operate easily or are otherwise defective.
  - K. Set plumb and support valves adequately in conformance with instructions of manufacturer. Shim valves mounted on face of concrete vertically and grout in place. Install valves in control piping for easy access.
  - L. Provide sleeve type coupling or flexible type grooved coupling on downstream side of buried valves to assist in valve removal.
  - M. Provide valves with extension stems where required for convenience of operation. Provide extension stems for valves installed underground and elsewhere so that operating wrench does not exceed 6 ft. in length.
  - N. Provide chain wheel operators on all valves 2-in., and larger where handwheel or lever exceeds 6-ft., 6-in. above floor or operating platform. Provide geared operator where required to position chainwheel in vertical position.
  - O. Chain of chain operators to extend within 3 ft. of operating floor. Provide two S-shaped hooks for each chain to enable chain to be hooked away from personnel traffic.
- 3.2 PLASTIC PIPING (PVC). The installation of plastic pipe for pressure service shall be strictly in accordance with the manufacturer's technical data and printed instructions and as follows:



- A. General. The solvent welding procedure detailed herein applies to all Polyvinyl Chloride (PVC) pressure piping systems including molded fittings and socket type pump and valve connections.
- B. Cement. Shall be a grade specifically recommended by the piping manufacturer for the size and schedule of pipe specified.
- C. Pipe Preparation.
  - 1. Cutting. Pipe shall be cut in accordance with the recommendations of the pipe manufacturer.
  - 2. Deburring and Beveling. All burrs, chips, filings, and the like shall be removed from both the pipe inside diameter and outside diameter before joining. All pipe ends shall be beveled approximately 1/16-inch to 3/32-inch back from the edge at an angle of 10 to 15 degrees.
- D. Fitting Preparation. Prior to solvent welding, all fittings and couplings shall be removed from their cartons and exposed for at least one hour to the same temperature conditions as the pipe in order to assure that they are thermally balanced before joining.
- E. Cleaning. Pipe and fittings shall be clean of all loose dirt and moisture from the inside diameter and outside diameter of the pipe end and the inside diameter of the fitting. DO NOT ATTEMPT TO SOLVENT WELD WET SURFACES.
- F. Priming. Apply primer to the pipe approximately one-half (1/2 of the pipe diameter and in accordance with the manufactures recommendations). Apply primer freely in the socket keeping surface wet and applicator wet and in motion 5 to 15 seconds. Avoid puddling in socket. For checking penetration, you should be able to scratch or scrape a few thousandths of the primed surfaces away. Repeated applications to either or both surfaces may be necessary. Weather conditions do affect priming action. In cold weather more time is required for proper penetration.
- G. Solvent Cement Application. Solvent cement application shall be in accordance with the manufactures recommendation with a minimum of two coats. All excess cement shall be cleaned from the surfaces of the pipe and fittings.
- H. Joining. Joining of PVC pipe and fitting shall be in accordance with the manufacturer's recommendations and only at the below solvent welding joining temperatures and joint drying times:
  - 1. THE ACTUAL JOINING SHOULD NOT BE DONE IN ATMOSPHERIC TEMPERATURES BELOW 40°F OR ABOVE 90°F, OR WHEN EXPOSED TO DIRECT SUNLIGHT.
  - 2. NOT LESS THAN 48 HOURS OF JOINT DRYING TIME SHALL ELAPSE FOR ALL SIZES OF PIPE AND DRYING TEMPERATURES

BEFORE THE JOINT IS MOVED OR SUBJECTED TO ANY APPRECIABLE INTERNAL OR EXTERNAL PRESSURE.

Note: Joints for plastic pipe shall be solvent welded except flanged or screwed where required. For plastic to steel, cast iron pipe or ductile iron pipe connections, complete metal pipe assembly first. Use flanged connections and tighten bolts evenly to prevent warping of rigid plastic pipe. A torque wrench may be used for a tight seal on gasket. Joints shall conform to manufacturer's recommendations installation of valves and fittings shall be strictly in accordance with manufacturer's instructions. In making solvent weld connections, the solvent should not be spilled on valves or allowed to run from joints. All completed pipe lines shall remain undisturbed for 48 hours to develop complete strength at all joints.

### 3.3 STAINLESS STEEL PIPING

- A. Cleaning: For items cleaned prior to shipment to the construction site, they shall be properly packaged and stored to protect from contamination. Precleaned items shall be provided a final cleaning/purge with all piping and appurtenances installed.
- B. Welding
  - 1. Perform in accordance with Section IX, ASME Boiler and Pressure Vessel Code and ASME A: B31.1 for Pressure Piping, and if recommended by piping or fitting manufacturer.
  - 2. Weld Identification: Mark each weld with symbol identifying welder.
  - 3. Pipe End Preparation:
    - a. Machine Shaping: Preferred.
    - b. Oxygen or Arc Cutting: Smooth to touch, true, and slag removal by chipping or grinding.
    - c. Beveled Ends for Butt Welding: ASME B16.25.
  - 4. Surfaces:
    - a. Clean and free of paint, oil, rust, scale, slag, or other material detrimental to welding.
    - b. Clean stainless steel joints with stainless steel wire brushes or stainless steel wool prior to welding.
    - c. Thoroughly clean each layer of deposited weld metal, including final pass, prior to deposition of each additional layer of weld metal with a power-driven wire brush.
  - 5. Alignment and Spacing:
    - a. Align ends to be joined within existing commercial tolerances on diameters, wall thicknesses, and out-of-roundness.

- b. Root Opening of Joint: As stated in qualified welding procedure.
  - c. Minimum Spacing of Circumferential Butt Welds: Minimum four times pipe wall thickness or 1 inch, whichever is greater.
6. Climatic Conditions:
- a. Do not perform welding if there is impingement of any rain, snow, sleet, or high wind on the weld area, or if the ambient temperature is below 32 degrees F.
  - b. Stainless Steel and Alloy Piping: If the ambient is less than 32 degrees F, local preheating to a temperature warm to the hand is required.
7. Tack Welds: Performed by qualified welder using same procedure as for completed weld, made with electrode similar or equivalent to electrode to be used for first weld pass, and not defective. Remove those not meeting requirements prior to commencing welding procedures.
8. Surface Defects: Chip or grind out those affecting soundness of weld.
9. Weld Passes: As required in welding procedure.
10. Weld Quality: Free of cracks, incomplete penetration, weld undercutting, excessive weld reinforcement, porosity slag inclusions, and other defects in excess of limits shown in applicable piping code.

### 3.4 TESTING OF PROCESS PIPING AND VALVES

- A. General. All piping and piping systems shall be leak tested by the Contractor in the presence of the Engineer. The Contractor shall provide typed and witnessed test reports for all such tests. All piping and piping systems not complying with the leak test shall be repaired or replaced by the Contractor to the satisfaction of the Engineer and be re-tested all at no additional cost to the Owner.
- 1. After the pipelines have been completed and all supports and restraints have been installed, the Contractor shall perform all pressure tests. The Contractor shall be responsible for furnishing all labor, materials, and equipment so that such tests can be accomplished at the time locations necessary.
  - 2. All lines shall be hydrostatically tested for a period of two consecutive hours. The test pressure shall be that of the pipe design pressure or 1.5 times the apparent working pressure, whichever is the greater. The piping and piping system shall withstand the test pressure with a maximum loss of ten percent of the test pressure.
  - 3. Piping, valves, and those items contacting process water shall be disinfected as specified under AWWA Standards C651 - Disinfecting Water Mains, latest version. Refer to Section 02615 – Ductile-Iron Pipe and Fittings.

### 3.5 VALVE FIELD TESTING

- A. All valves tested in conjunction with hydrostatic testing of the respective piping.
- B. Test all valves' smoothness of operation after installation, and make any necessary adjustments, repairs or replacements.

### 3.6 SHOP PAINTING

- A. Both the inside and outside surfaces of all ferrous materials, equipment, and devices shall be thoroughly cleaned at the shop.
- B. All ferrous parts/components, except machine surfaces and others obviously not to be painted, and as otherwise specified hereinbefore (including referenced AWWA Standards), shall be furnished with primer coats of rust inhibitive primer compatible as specified in Division 9 – Finishes. Where applicable, surface preparation and primer coating shall be as specified in Division 9 – Finishes. All machined surfaces subject to corrosion shall be coated with a rust preventer/inhibitor prior to shipment. Contractor shall follow Manufacturer's recommendations for preventing corrosion prior to installation and operation.

### 3.7 PAINTING

- A. As specified in Division 9.

### 3.8 PIPING IDENTIFICATION

- A. **Stainless steel pipe shall be labeled in accordance with Section 10140.**
- B. All other piping shall be stenciled as specified in Division 9.

### 3.9 FIELD QUALITY CONTROL FOR WELDING

- A. Minimum Duties of Welding Inspector:
  - 1. Job material verification and storage.
  - 2. Qualification of welders.
  - 3. Certify conformance with approved welding procedures.
  - 4. Maintenance of records and preparation of reports in a timely manner.
  - 5. Notification to Engineer of unsatisfactory weld performance within 24 hours of weld test failure.
- B. Required Weld Examinations:
  - 1. Perform examinations in accordance with Piping Code ASME B31.1.

2. Perform examinations for every pipe thickness and for each welding procedure, progressively, for all piping covered by this section.
3. Examine at least one of each type and position of weld made by each welder or welding operator.
4. For each weld found to be defective under the acceptance standards or limitations on imperfections contained in the applicable Piping Code, examine two additional welds made by the same welder that produced the defective weld. Such additional examinations are in addition to the minimum required above. Examine, progressively, two additional welds for each tracer examination found to be unsatisfactory.

### 3.10 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION 11200



## SECTION 11212

### GREENSAND-PLUS PRESSURE FILTER SYSTEM:

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This section of the specifications provides for furnishing and installing an automatic pressure type filtration system complete and operable as indicated on the drawings and as specified herein.
- B. The following items shall be included in this section and are to be furnished by the water treatment equipment manufacturer:
  - 1. Treatment Vessels
  - 2. Inlet Distributor/Waste Collectors
  - 3. Underdrain Distributors
  - 4. Support Gravel
  - 5. Filtration Media
  - 6. Control and Isolating Valves
  - 7. Filter Face Piping
  - 8. System Interconnecting Piping
  - 9. Control Panel
  - 10. Equipment Assembly
  - 11. Filter Backwash Pump
  - 12. Backwash Supply Tank
- C. All interconnecting wiring and conduit, motor starters, and appurtenant electrical work running up to the filtration system shall be furnished and installed by the general contractor in accordance with specification section 16001, "ELECTRICAL".
- D. The equipment specified herein is based on the filter system as manufactured by Hungerford & Terry, Inc., Clayton, New Jersey, (856-881-3200). Filter systems furnished by other acceptable manufacturers shall be considered provided they conform with these specifications and filter configuration drawing(s).

##### 1.3 SUBMITTALS:

- A. The filtration equipment supplier shall submit to the Engineer a pdf. document with complete sets of shop drawings, details, data sheets, and other descriptive drawings and material as may be required to fully describe the equipment proposed and to

verify compliance with the contract documents.

- B. All submittals shall be complete, neat, and orderly. The submittals shall include the following, as applicable:
1. Custom, CAD generated shop drawings pertinent to this specific application showing interconnections of the components in the system, including scaled double line piping drawings (schematics will not be acceptable), control logic schematic/wiring diagrams, control panel drawings to include front panel view, internal wiring detail, and panel internal arrangements, control panel equipment charts, equipment arrangements, installation and erection details, anchor bolts, equipment pads, etc.
  2. Detailed descriptions of each piece of equipment specified.
  3. Description of the operation and control of the equipment along with an annotated copy of the control logic program.
  4. Four (4) copies of operation and maintenance requirements for the system.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

- A. The treatment system shall be furnished by a single manufacturer who is an established manufacturer of water treatment systems and who shall:
1. Be an American owned and operated company and furnish proof of successful operating experience during the last ten (10) years on ten (10) municipal installations comparable in size and flow rate to that specified herein.
  2. In order to facilitate support for system operation the equipment provider must have their corporate office and assembly facility located less than an 8 hour drive or under 500 miles from the job location.
  3. Accept responsibility for the satisfactory operation of the entire filtration system and equipment.
  4. Guarantee for a period of one (1) year from the date of acceptance that all equipment is free from defects in design, materials, and workmanship. Furnish replacement parts for any defective component at no cost to the owner.
  5. Alternates will need to provide the following information in order to be considered.



- a. Custom, CAD generated shop drawings pertinent to this specific application showing interconnections of the components in the system, including scaled double line piping drawings (schematics will not be acceptable), control logic schematic/wiring diagrams, control panel drawings to include front panel view, internal wiring detail, and panel internal arrangements, control panel equipment charts, equipment arrangements, installation and erection details, anchor bolts, equipment pads, etc.
  - b. Proposed V&E list
  - c. Pilot lab report proving comparable treatment capability. The pilot lab shall be run for a minimum of 10 business days. The final report must be presented at least 14 business days prior to the closing of the bid.
- B. The contractor shall also submit with his bid sufficient detailed information pertaining to each substitute piece of equipment and/or material that the contractor has listed as a "substitute" in the proposal.
- C. Failure to submit information on substitute equipment and/or materials at the time that the proposal is received by the owner, is cause for rejection of the proposed substitute, and only the specified equipment and/or materials will be permitted to be incorporated in the finished project.
- D. It is the intention of these specifications that the pressure filter specified in this section shall be furnished as part of a coordinated system supplied by a single manufacturer so that undivided responsibility for a complete and operable system is assured. The pressure filter manufacturer shall be the coordinating supplier of the pressure filter system. The pressure filter system shall include the pressure filters and all other equipment and accessories specified herein.
- E. The supervisory service of a factory trained field service technician who is specifically trained in this type of equipment shall be provided for a period of five (5) cumulative 8-hour man days over two (2) trips during construction. He shall assist the general contractor or subcontractor with technical advice on the installation of the major components of the treatment equipment including:
- 1. Placement of the gravel support material.
  - 2. Proper placement and conditioning of the filter media.
  - 3. Proper installation of the interconnecting pipe and wiring.
- F. Upon completion of the installation, the services of the factory trained field service technician shall be provided for a period of not less than two (2) 8-hour man days to check the completed installation, make any required adjustments, and place the system in satisfactory operation.
- G. In addition to the above, the manufacturer shall provide the services of the factory trained field service engineer for a period on not less than one (1) 8- hour man days

for instructing the plant operating personnel in the proper care and operation of the equipment.

## 2.2 PERFORMANCE AND DESIGN REQUIREMENTS:

A. The pressure filter system shall be specifically designed to provide filtration and treatment for iron and manganese removal from groundwater. The filter media shall consist of GreensandPlus and anthracite. A sodium hypochlorite chemical feed system shall serve to catalytically regenerate the GreensandPlus.

B. Design requirements are as follows:

1. All system components shall be approved by NSF 60 and 61.

2. The pressure filter equipment shall be designed based on the following requirements:

- |    |                                    |             |
|----|------------------------------------|-------------|
| a. | System design flow rate            | 16 GPM      |
| b. | Unit design flow rate              | 16 GPM      |
| c. | Filter loading rate at design flow | 2.6 GPM/FT2 |
| d. | Normal maximum operating pressure  | 100 PSI     |
| e. | Influent water quality:            |             |

Iron	2.0 mg/L, avg
Manganese	0.3 mg/L, avg

3. The pressure filter backwash water source is to be a separate filtered water source. Temperature of the backwash water will be 55 degrees F.

a. Normal filter backwash rate..... 12 GPM/FT2 @ 55 deg. F.

C. Performance Guarantee, Testing and Remedies:

1. The pressure filter manufacturer shall review the filter influent raw water quality and the specific requirements of these specifications, and shall guarantee in writing that the equipment supplied meet the following requirements:

- |    |  |                |
|----|--|----------------|
| a. | Filter Run Volume prior to backwash            | 46,480 gallons |
| b. | Maximum Iron (Fe) concentration                | 0.3 ppm        |
| c. | Maximum Manganese (Mn) concentration           | 0.05 ppm       |
| d. | Maximum Cl <sub>2</sub> dosage                 | 4.0 mg/l       |
| e. | Minimum Cl <sub>2</sub> Effluent Concentration | 1.0 mg/l       |

2. The manufacturer shall demonstrate compliance with the performance guarantee through performance testing prior to acceptance. The performance test will include two consecutive filter runs of 46,000 gallons with six samples taken during the test. The samples will be taken at the beginning of

the run and at a 20,000-gallon interval, laboratory costs for the samples shall be paid for by the Owner. The samples will be tested for iron, manganese and chlorine residual. Acceptance will be based on 100% of the samples meeting the specified parameters.

3. Performance Guarantee shall be based upon the specified Raw water quality and chemical feed rates
4. If the manufacturer does not meet the performance requirements after the initial test, he will be provided two weeks to adjust, balance and modify the filters to meet the project specifications. At the end of the two weeks, the manufacturer will be required to demonstrate compliance through a second performance test. All criteria shall be the same, however laboratory testing for the re-test shall be at the manufacturer's expense.

## 2.3 EQUIPMENT DESIGN:

### A. FILTER TANKS:

1. System will consist of two (2) vertical pressure filters, 36 inch O.D. by 63 inch straight shell.
2. The filter tanks shall be of welded steel construction using SA-516 Grade 70 steel, and shall be tested to withstand a hydrostatic pressure 30% in excess of the designed working pressure of 100 psi. The tanks shall be designed in accordance with the requirements of the latest ASME code section VIII construction and include the code stamp.
3. Tanks are to include the following features:
  - a. One (1) 12 inch x 16 inch elliptical manhole with a spare gasket.
  - b. Flange nozzle type connections as shown on the drawings.
  - c. Two (2) lifting lugs.
  - d. Four (4) angle support legs.
  - e. Necessary # 304 stainless steel clips and studs to for gravel retaining screen
  - f. Tank interiors are to be cleaned and debris free
  - f. Finish painting of the tank exteriors shall be applied in the field after the equipment is mounted and plumbed in accordance with the requirements of Division 9.

B. Filter Inlet Distributors:

1. Each filter shall be furnished with an H-type inlet distributor/backwash collector system designed with schedule 80 PVC pipe and fittings. The hub will extend down from the tank top head and include two (2) lateral arms, each ending with two (2) upturned elbows. The distributing system shall be designed for uniform distribution of inlet water over the entire filter bed and for the uniform collection of the backwash water during the backwash operation. A trough or splash plate type distributor will not be accepted.
2. The inlet distributors are to be installed by the filter manufacturer prior to shipment.

C. Supplemental Air Wash Distributor:

1. Each filter tank shall be furnished with a separate header-lateral air wash distributor located near the top of the gravel support bed. The distributor shall be constructed of Schedule 40 304 stainless steel pipe and fittings. The design of the air wash system will include a 2 inch central manifold with 1/2 inch laterals on 7.5 inch maximum centers. Each lateral shall be supported from the gravel retaining screen with 1 inch 304 stainless steel pipe and all necessary stainless steel fasteners. The air discharging orifices shall be formed by drilling holes every 3 inches, approximately
2. Air and water must have separate distributors. Air distribution through the same inlet as the underdrain will not be accepted.
3. The air wash distributors shall be field installed by the general contractor.

D. Gravel Retaining Screen

1. Each filter tank shall be furnished with a gravel retaining screen assembly consisting of all necessary #304 stainless steel angles, #304 stainless steel flats, tank clips, #304 stainless steel screen, and #304 stainless steel welding studs and fasteners. Tank clips shall be 1/4 inch thick plate 1.5 inches wide x 3.5 inches long. These clips will act as connecting points for the steel support angles and flats of various lengths. Angle clips for support of the air wash distributor shall be welded to the cross angles. The cross angles will support an 8 mesh type 304 stainless steel screen with a wire diameter of 0.028 inches with an approximate overlap of three (3) inches. The stainless steel cross flats will hold and secure the screen to the cross angle supports. The filter tank is to include a row of #304 stainless steel Nelson pointed end welding studs every 8 inches around the circumference for screen attachment, and the steel cross angles shall include the welding studs every 12 inches.

E. Underdrain System:

1. Each filter shall be furnished with a non-ferrous underdrain system designed

to uniformly distribute backwash water and for collection of filtered water. The distributor shall be of the hub-curved radial lateral type design. The hub shall be of polypropylene construction. The laterals shall be constructed of schedule 80 PVC, and are to be curved to follow the contour of the tank bottom head. The filter tank bottom head is to include #304 stainless steel threaded studs and clips to securely clamp the laterals in place.

2. The underdrain systems are to be installed by the filter manufacturer prior to shipment.

F. Gravel Supporting Bed:

1. A gravel support bed shall be incorporated in the bottom of each vessel, consisting of five (5) layers of graded gravel, with the largest size gravel loaded into the filter first and the succeeding smaller sizes placed on top. The gravel graduations shall be as follows:

1/8" x 1/16"	3.0 inches
1/4" x 1/8"	3.0 inches
1/2" x 1/4"	1.5 inches
3/4" x 1/2"	1.5 inches
1.5" x 3/4"	3.0 inches
1.5" x 3/4"	bottom head fill

2. The gravel shall be washed and shipped in clearly marked fifty(50#) pound bags. The gravel must meet the requirements of the American Water Works Association (AWWA) Specification number B-100-89.

G. Filtration media:

1. Each filter is to be provided with an 18 inch deep bed of GreensandPlus. The GreensandPlus is to meet the following criteria:

a.	Specific gravity:	approx. 2.4
b.	Effective size:	0.30 - 0.35 mm
c.	Uniformity coefficient:	less than 1.6
d.	Screen grading:	18 x 60 mesh

2. In addition to the GreensandPlus filter media, the equipment supplier shall provide an 18" depth of specially graded anthracite cap. The anthracite is to meet the following criteria:

a.	Specific gravity:	approx. 1.6
b.	Effective size:	0.6 - 0.8 mm
c.	Uniformity coefficient:	less than 1.6

3. The total GreensandPlus and anthracite bed depth shall total 36 inches.

4. The anthracite shall be shipped in one (1) cu.ft. bags. Gravel shall be shipped in one half ½ cubic foot bags on pallets, and the GreensandPlus shall be shipped in ½ cubic foot bags on pallets.
5. All media shall be accepted under ANSI/NSF Standard 61.
6. GreensandPlus shall be loaded into the filters and conditioned in accordance with the manufacturer's recommendations.
7. The contractor shall furnish 40 pounds of HTH (65 % available chlorine by weight) for every 100 cubic feet of GreensandPlus filter media as required for the initial conditioning of the media.

H. Filter exterior valving:

1. Each filter shall be furnished with an automatic and manual valve nest exterior consisting of the following:

- a. Automatic valving:

Bray Series 20 butterfly control valves with wafer style cast iron bodies, nylon coated discs, metal reinforced EPDM seats, with Bray Series 70 electric motor operators with auxiliary limit switches, and anti-condensation heaters.

Valves are to be furnished for the following filter sequences:

1. Inlet (1.5 inch)
2. Outlet (1.5 inch)
3. Backwash inlet/ slow refill (2.5 inch)- modulating
4. Backwash outlet (2 inch)
5. Rinse (1 inch)
6. Tank Draindown (1.5 inch)

- b. Manual isolating valves:

Bray Series 20 butterfly valves with wafer style cast iron bodies, nylon coated discs, field replaceable EPDM seats, and manual gear operators.

Valves are to be furnished for the following:

1. Inlet isolating (1 inch)
2. Outlet isolating (1 inch)

- c. Manual ball valves:

Simtech TBB series TRU union ball valve, PVC body, PVC ball and

stem, EPDM seals, union ends with manual lever operators.

1. Drain (1 inch)

d. Flow-Tek series S80 stainless steel ball valve with manual lever operator.

1. Backwash tell-tale (1/2 inch)

2. Air vent (1 inch)

e. APCO model 200A air release valve with threaded, cast iron body, stainless steel float, BUNA-N seat, 1 inch NPT inlet, 1/2 inch NPT outlet connections and 3/16<sup>th</sup> orifice (100 PSI)

1. Air release valve

I. Filter System Piping:

1. Water service piping:

a. All filter face and interconnecting piping is to consist of schedule 80 PVC pipe with Schedule 80 PVC fittings and flanges.

2. General notes:

a. The filter manufacturer shall support all skid mounted piping and valves from the tank and/or skid as required.

b. All system face and interconnecting piping shall be furnished with the required bolts, studs, nuts, and gaskets as follows:

Bolts: ASTM A307 grade B plated carbon steel

Studs: ASTM A307 grade B plated carbon steel

Nuts: ASTM A563 or A194 2H plated steel heavy hex

Washers: ASTM A307 grade B plated carbon steel

Gaskets: Koroseal or equal, 1/8" thick for PVC

J. System accessories:

1. Filter Pressure Equipment

a. Differential Pressure Transmitter

i. Type: Electronic variable capacitance; two-wire transmitter; "smart electronics". Includes transmitter, three-valve manifold, and communicator (DPIT 201A and 201B)

- ii. Performance: Range – 0 to 100 psi; Maximum adjustable range – noted range shall be between 40% and 80% of the maximum adjustable range. Accuracy – plus or minus 0.075 percent of span. Temperature – operating range -20 degrees F to 150 degrees F, minimum.
- iii. Physical/Features: Materials - all wetted parts including process flanges and drain/vent valves, 316 SS unless otherwise noted. Wetted O-rings: Glass filled TFE, Graphite Filled PTFE or Viton unless otherwise noted. Damping – Fluid or electronic type with adjustment. Indicator – Four-digit LCD indicating the noted range. Suppressed or elevated zero when noted. Signal Interface – 4 to 20 mA dc output for load impedance of 0 to 500 ohms minimum; Digital process variable signal superimposed on 4-20 mA signal; support HART protocol type device.
- iv. Power Requirements: 24V dc supply.
- v. Enclosure: NEMA 4X; Mounting – Pipe or wall as noted. Provide stainless steel brackets with stainless steel bolts. Housing – Modular with separate compartments for electronics
- vi. Three-valve manifold: Type 316 Stainless Steel.
- vii. Communicator: Quantity – One per lot of differential pressure transmitters provided under Contract, unless otherwise noted. Features – 8.0 MB program memory; 2 KB transmitter data; disposable AA 1.5V batteries. Factory Mutual (FM) Intrinsic Safety Approval – intrinsically safe for Class I, Division 1, Groups A, B, C, and D. HART communicator.
- viii. Manufacturers: Rosemount – Model 3051CD; SMAR – LD301 Series; Foxboro – Series IDP10 or Engineer approved equal.
- b. Pressure Gauges - all pressure gauges shall be of the indicating-dial type in accordance with ASME Designation B40.100.
  - i. The case shall be of the liquid-filled type, drawn steel or cast aluminum, 4-1/2 inches in diameter.
  - ii. The pressure-element assembly shall be of the Bourdon tube, unless otherwise indicated.
  - iii. The pressure connection shall be brass, NPS 1/4, bottom-outlet type unless the back-outlet type is indicated.
  - iv. The movement shall be mechanical with a link to the pressure element and connection to pointer.
  - v. The dial shall be satin-faced, non-reflective aluminum with permanently etched scale markings.
  - vi. The pointer shall be red metal.



- vii. The window shall be glass.
- viii. The ring shall be metal.
- ix. The accuracy shall be Grade A, plus or minus one (1) percent of middle half scale.
- x. The vacuum-pressure range shall be 30-inches of mercury of vacuum to 15 psig of pressure.
- xi. The range for fluids under pressure shall be two (2) times the operating pressure.

2. Filter Flow Equipment:

- a. Each filter inlet header shall be equipped with a Rosemount 8750WA magnetic flowmeter, complete with 150 lb. flanged carbon steel process connections, polyurethane liner, #316 stainless steel electrodes, integral mounted aluminum NEMA 4X housing with local display and 4-20 mA output, and grounding rings.

K. Filter Backwash Pump

- 1. Contractor shall furnish and install an end suction close coupled pump complete with pump and motor in accordance with manufacturer's recommendations and plans.
- 2. The pump shall have a design point of 85 gpm at 40 feet of TDH.
- 3. Pump shall be Grundfos end suction close coupled pump, PACO Model LC, or approved equal.
- 4. Pump:
  - a. The pump shall be close coupled, single stage, end suction top discharge design.
  - b. The head-capacity curve shall have a steady rise in head from maximum to minimum flow within the preferred operating region.
  - c. The pump shall be of the back pull-out design so that the rotating element can be removed from the casing without disconnecting the suction or discharge piping. The casing material shall be close-grained cast iron ASTM A48 - Class 30 with a minimum tensile strength of 30,000 P.S.I. Volute shall have integrally cast suction and discharge connections, gauge ports at nozzles, and vent and drain ports. Pump shall have suction splitter to reduce pre-rotation and improve efficiency. Casing shall be designed for scheduled working pressure and can withstand hydrostatic test at 150% of the maximum working pressure under which the pump could operate at design speed.

- d. Pump shall NPS straight threaded connections on both suction and discharge.
- e. The motor shaft shall be of cold rolled steel AISI 1024 with bronze sleeves covering the wetted area of the shaft.
- f. Mechanical seals shall have ceramic stationary seats, carbon rotating seats, buna elastomers and stainless steel hardware. Application of a mechanical seal shall be internally flushed type, without requiring external flushing lines. Seals shall be capable of being inspected and easily replaced without removing the piping or volute.
- g. Impeller shall be of the enclosed Francis vane type, single suction design, made AISI 304 stainless steel, both hydraulically and dynamically balanced to ISO 1940-1:2003 balance grade G6.3 and keyed to the shaft. The impeller shall be trimmed to meet the specific hydraulic requirements.
- h. Pump Construction. The standard material of construction for the pump shall be as below:
  - Volute: Cast Iron ASTM A48 - Class 30
  - Case Wear ring: Tin Bronze ASTM B584-90500
  - Impeller: AISI 304
  - Shaft: Steel AISI 1040
  - Shaft Sleeve: Bronze III932 C89835
  - Mechanical Seals: Carbon – Ceramic with Buna Elastomers and Stainless Steel hardware
- i. Pump rotation shall be clockwise as viewed from the motor end.
- j. Cast iron base with integrally cast drip lip, grouting holes and tapped drain outlet shall be provided upon requirement.
- k. Pump shall be of a maintainable design for ease of maintenance and should use machine fit parts that are easily disassembled.
- l. Each pump shall be painted with one coat of high quality factory approved paint and name-plated before shipment from the factory.
- m. Pumps shall be NSF-61 certified.
- n. Pumps shall be manufactured and assembled in an ISO-9001 certified facility.

5. Motor

- a. Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Pump and motors shall be factory assembled.
- b. Motors shall be suitably sized per ISO5199 and shall meet NEMA specifications and conform to the standards outlined in EISA 2007.
- c. Motors shall be totally enclosed fan cooled.
- d. Motors shall be suitable for operation on a variable frequency drive.
- e. Motors shall have 1.15 service factor.

L. Filter system control panel:

1. NEMA 4 electrical control panel of painted (ANSI 61 light gray) steel construction complete with an Allen Bradley Micrologix 1400 Ethernet programmable controller, Automation Direct #EA9-T10CL 10 inch diag. color touch screen Operator Interface Terminal and all required nameplates, Phoenix Contact #UT-4 terminal blocks, internal type "THHN" wire, Phoenix Contact AC surge suppressor, 24VDC power supply, C3 Controls door mounted disconnect switch, Allen Bradley #700-HK series interposing relays, Panduit Type "G" gray wire duct, Phoenix contact heat-shrink white wire sleeves, Leviton Ethernet surge suppressor, GFCI duplex, UL-508 label, and etc.
  - a. The control panel will be completely shop wired and tested prior to shipment.
  - b. All interconnecting wiring, conduit, and wire terminations between the Filter System Control Panel and remote located electrical equipment is to be furnished and installed by the contractor. A 120VAC-1PH-60Hz, 20A power feed is required for control panel.
  - c. H&T will supply one (1) spare Ethernet port for communication to SCADA System (by others) via Ethernet/IP protocol. Required interconnecting Ethernet cable and connections shall be by others.
  - d. Control Panel shall be skid mounted and pre-wired to all skid mounted electrical equipment.

M. System Software And Programing:

1. Programming integral to the operation of the equipment will be performed by the system supplier.

N. Shop Assembly:

1. Both filter tanks shall be mounted together on a single structural steel I-beams and channel skid and be complete with the inlet and underdrain distributors, exterior face piping and valves as practical, and the NEMA 4X control I/O Panel with wiring and Sch 80 PVC conduit, fittings, and non-metallic flexible conduit to each skid mounted electrical device.
2. The media, interconnecting piping, and system auxiliary equipment shall be shipped separately.
3. Filter skids are to be cleaned by power wirebrushing and painted with one (1) shop coat (3.0 – 5.0 mils DFT) of Tnemec 69F primer by the filter manufacturer prior to assembly.
4. Finish painting Tank exteriors will be commercial sandblasted (SSPC-SP6) and painted with one (1) primer coat (3.0-4.0 mils DFT) of Tnemec series 90-97, one (1) intermediate coat (3.0-5.0 mils DFT) of Tnemec 161-EN15, and one (1) finish coat (2.5-5.0 mils DFT) of Tnemec 73-112GN Endura Shield ANSI #61.

- O. Backwash Supply Tank: furnish and install a 1,500 gallon plastic water tank molded of polyethylene resin 64” in diameter. Tank shall be model DC-901500 as manufactured by Dura-cast, or approved equal. Refer to mechanical drawings for the location and sizes of required openings and fittings. Contractor and Manufacturer shall coordinate location and size of fittings with Engineer approved piping layouts.

### PART 3 – EXECUTION

#### 3.1 EXAMINATION

- A. Verify that dimensions are as shown on Drawings and Shop Drawings.
- B. Review manufacturer’s installation instructions. Verify that equipment and hardware are as described or detailed.
- C. Beginning of installation means acceptance of existing conditions.

#### 3.2 INSTALLATION

- A. Manufacturer's Service Representative: The filters shall be furnished complete by the manufacturer and shall be assembled, erected and installed by the contractor as directed by the manufacturer in his working drawings and written instructions. The installation, alignment, testing and grouting shall be checked and approved by a factory representative before acceptance.

### 3.3 MANUFACTURER'S SERVICES

- A. The manufacturer shall furnish the services of trained technical representatives as needed to provide for a satisfactorily operating system. Services to be included are as follows:
1. Prior to equipment delivery, the manufacturer shall furnish jointly to the ENGINEER and CONTRACTOR a minimum of three sets of complete installation, operation and maintenance manuals which shall include erection drawings, as built drawings of electrical equipment, assembly details, parts lists, and detailed written instructions for the installation, operation and maintenance of the equipment furnished.
  2. Deviations from the manufacturer's written or verbal instructions shall be subject to approval by the ENGINEER and discrepancies or unsatisfactory work shall be reported in writing by the equipment manufacturer's representative jointly to the ENGINEER and CONTRACTOR.
- B. The supervisory service of a factory trained field service technician who is specifically trained in this type of equipment shall be provided for a period of (5) 8-hour man days over 2 trips, during construction. He shall assist the equipment installer or subcontractor with technical advice on the installation of the major components of the treatment equipment including:
1. Proper setting of the interior piping
  2. Placement of the gravel support material.
  3. Placement of GS+, Backwash and Undercutting of GS+
  4. Placement of Anthracite
- C. Upon completion of the installation, the services of the factory trained field service technician shall be provided for a period of (4) consecutive 8-hour man days to check the completed installation, make any required adjustments, delete initiate a trial performance run, and place the system in satisfactory operation.
- D. In addition to the above, the manufacturer shall provide the services of the factory trained field service technician for a period of (2) 8-hour man day for instructing the plant operating personnel in the proper care and operation of the equipment.

### 3.4 MANUFACTURER'S WARRANTY

- A. The warranty is the sole responsibility of the equipment manufacturer and that manufacturer's warranty shall be provided in written form for inclusion with both the submittal covering the specified equipment and the O&M manuals provided with that equipment.
- B. The warranty period shall be a non-prorated period of 12 months from date of installation, not to exceed 18 months from date of manufacture. Warranty shall cover against defective material and/or faulty workmanship.

END OF SECTION

## SECTION 11313

### CHEMICAL FEED EQUIPMENT

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This Section includes:
  - 1. Peristaltic Chemical Metering Pumps
  - 2. Chemical Containment Pallet
  - 3. Carboy Scale
  - 4. 12.5% Sodium Hypochlorite (5 gallon carboy)
  - 5. Other associated equipment for the chemical metering pumps.
- B. RELATED SECTIONS
  - 1. Division 1 – General Requirements
  - 2. Division 11 – Equipment
  - 3. Division 13 – Special Construction
  - 4. Division 16 – Electrical

##### 1.3 SYSTEM DESCRIPTION

- A. The Contractor shall furnish and install the chemical metering pumps as shown on the Contract Drawings. The chemical metering pumps shall be peristaltic type metering pumps including all appurtenances and accessories as described herein. The pumps shall be fully compatible with the chemicals being pumped.
- B. The pump manufacturer is responsible for ensuring that all equipment and systems required for a complete operating system are provided, and compatible and suitable for the project conditions.
- C. The equipment covered by these Specifications shall be standard equipment of proven ability as supplied by reputable suppliers having a long experience in the production of such equipment.

##### 1.4 SUBMITTALS

- A. The shop drawing submittals for chemical metering pump shall contain pump curves, plans, and sections showing dimensions, materials of construction, details, design

data, test reports showing rated flow and steady state accuracy at 100 percent setting, certification of factory testing, operation and maintenance manuals, warranty, and installation instructions.

- B. Shop drawings shall be submitted for all appurtenances, including calibration columns, valves, electrical and instrumentation wiring diagrams, safety valves, flow indicators, and all other associated equipment. A chemical area layout plan indicating pumps, tanks, and equipment pad locations shall be provided by Contractor for Engineer/Owner approval prior to installation.
- C. Operating and Maintenance Manuals: Include manufacturer's instructions for equipment installation, start-up, operation, and maintenance, including parts lists for operation and maintenance manuals specified in Division 1.

#### 1.5 OPERATIONS AND MAINTENANCE INSTRUCTION MANUALS

- A. Operation and Maintenance Manuals: Submit materials for inclusion in Operating and Maintenance Manuals specified in Division 1.
- B. Furnish six (6) complete sets of Operations and Maintenance Instruction Manuals (O&M Manuals) prior to start-up.
- C. O&M manuals shall be prepared with clear instructions which will enable the Owner's personnel to operate and maintain all chemical feed equipment and systems.
- D. The manuals shall be prepared specifically for each installation. General literature from the equipment manufacturer that is not specifically applicable to the operation and maintenance of the installed items shall not be acceptable.
- E. The manuals shall be comprehensive and as a minimum contain:
  - 1. Description and operating instruction for all mechanical components.
  - 2. Instructions relevant to all modes of equipment operation.
  - 3. Service and trouble-shooting instructions of equipment supplied.
  - 4. Procedures for the adjustment of equipment at initial start-up, during routine preventative maintenance, and following replacement or repair.
  - 5. Instructions for testing and calibration of electronic components as may be required to determine proper performance.
  - 6. Detailed operating instructions for normal and emergency operation conditions.
  - 7. As-Built Mechanical drawings and dimensional information showing the actual layout and location of equipment components within the structures.



## PART 2 – PRODUCTS

### 2.1 PERSISTALTIC METERING PUMPS

- A. The metering pumps shall be microprocessor controlled, peristaltic-type Model Flex-Pro M-3 as manufactured by Blue-White Industries M-Series, or approved equal.
- B. Drawings and specifications indicate general arrangement and layout based on pumping equipment supplied by hereinafter specified manufacturers. If equipment accepted requires arrangement, dimensions, or design which differs from that indicated or specified, or additional equipment not specified, any costs for modifications required are to be borne by the Contractor.
- C. Electrical equipment and materials shall be listed by Underwriters' Laboratories, Inc. wherever standards have been established by that agency.
- D. All components of the equipment shall be engineered for long, continuous and uninterrupted service. Provisions shall be made for easy lubrication, adjustment, or replacement of all parts. Corresponding parts of multiple units shall be interchangeable.
- E. Metering pumps shall be a positive displacement, peristaltic type tubing pump with a brushless variable speed motor, non-spring loaded roller assembly located in the pumphead, with integral tube failure detection system, and flexible tubing with attached connection fittings. Process fluid shall contact the pump tubing assembly and connection fittings only. The pump shall be capable of self priming and running dry without damage.
- F. Pump head and tubing compression surface shall be corrosion resistant thermoplastic. The pump head cover shall be clear, annealed acrylic thermoplastic with an integral ball bearing fitted to support the overhung load on the motor shaft. Cover shall include an imbedded magnetic safety interlock which will limit the motor rotation speed when removed. Squeeze rollers with encapsulated ball bearings shall be directly coupled to a one piece thermoplastic rotor. Four polymeric rollers shall be provided; two squeeze rollers for tubing compression shall be located 180 degrees apart and two guide rollers that do not compress the tubing shall be located 180 degrees apart. The roller diameters and occlusion gap shall be factory set to provide the optimum tubing compression. Tube failure detection sensors shall be wholly located in the pumphead. Tube failure detection system shall not trigger with water contact. Float switch type switches shall not be used.
- G. Pump tube shall be constructed of noreprene and sized by pump manufacturer.
- H. Motor shall be reversible, brushless DC gear motor rated for continuous duty. Motor shall include overload protection. The power supply shall be 120 VAC 60 Hz, single phase with a 3-prong plug. Plug shall be 15 amp, 125 Volt, NEMA Type L5-15P, twistlock.

- I. Control circuitry shall be integral to the pump and capable of adjusting the pump motor speed (2,500:1 turndown ratio). The pump output shall be capable of being manually controlled via front panel user touchpad controls. Provide a 10-button front panel user touchpad control for stop/start, configuration menu access and navigation, operating mode selection, auto priming, display options selection, and reverse direction. The pump output shall be capable of being remotely control via 4-20mA analog input. Provide four contact closure alarm outputs. Each alarm output shall be assignable to any of the following pump functions: TFD system, FVS system, motor run/stop, motor failed to respond to commands, input signal failure, output signal failure, remote/local control setting, or pump operating mode.
- J. Pump shall include a flow verification system (FVS) with programmable alarm delay time from 1-255 seconds. FVS system shall monitor the FVS flow sensor while pump is running only. System shall not monitor pump while not running. Flow verification sensor shall be a paddlewheel type sensor compatible with the chemical being pumped.
- K. Sodium Hypochlorite Pump Design Criteria (also refer to mechanical schedule in Contract Drawings):

FEED SYSTEM LOCATION	NUMBER OF PUMPS	MAX. FEED RATE (GPH)	AVG FEED RATE (GPH)	MAX. PRESSURE (PSI)	LIQUID END CONST
ARMY CAMP	2	0.010	0.004	125	PVC
INDIAN SPRINGS	2	0.041	0.029	125	PVC

Chemical Being Pumped: Sodium Hypochlorite (12.5% as NaOCl)

## 2.2 CHEMICAL METERING PUMP APPURTENANCES AND ACCESSORIES

- A. Each chemical feed system shall be furnished with a pressure relief valve supplied with a pressure gauge on the discharge piping, which will allow for setting of the relief valves. Gauges shall be 2-inch diameter, 0-100 PSI, glycerin filled, and equipped with diaphragm assemblies that separate the gauge from the fluid.
- B. Backpressure/anti-syphon valve shall be furnished and installed with each chemical metering system. Backpressure/anti-syphon valve shall be ½” PVC material.
- C. Pulsation dampener shall be furnished and installed with each chemical metering system. Pulsation dampener shall be ½”, CPVC body with 10 cubic inch volume.
- D. Calibration Column shall be furnished and installed for use with each chemical metering system. Calibration columns shall be furnished and installed as indicated on the schematic drawings. Calibration column shall be 5 mL. and shall be constructed of a material compatible with sodium hypochlorite.

- E. Foot valve/strainer with ceramic weight assembly shall be furnished and installed with each chemical metering system to be installed on chemical feed pump suction tubing.
- F. Each metering pump shall be supplied with a rugged, polypropylene bracket for wall mounting. All mounting hardware shall be supplied and compatible with the chemical being pumped.
- G. Spare Parts to be furnished shall include:
  - 1. Tubing assemblies per peristaltic pump (20 total)
  - 2. 2 pressure gauges and isolation diaphragm assemblies
  - 3. 2 pressure relief valves
  - 4. 1 box of each type of fuse used
  - 5. 1 box of each type of light bulb used

### 2.3 WEIGH SCALE

- A. Weigh scale shall be a hi-accuracy digital carboy-scale model GR50HA as manufactured by Force Flow, approved equal. Scale shall include platform, electronic load cell with 10 feet of cable and wall-mounted digital weight indicator with 4-20 mA output signal.
- B. Scale accuracy shall be better than 1%.

### 2.4 CHEMICAL CONTAINMENT PALLET

- A. Each chemical feed system shall be furnished with a 62-gallon low profile 40"x40" polyethylene containment pallet as manufactured by Ultratech International, or approved equal.

### 2.5 EMERGENCY EYEWASH

- A. Each chemical feed system shall be furnished with a 20 gallon wall mounted portable eyewash station, model SE-4300 as manufactured by Speakman, or approved equal.

### 2.6 SODIUM HYPOCHLORITE CAR-BOY

- A. Contractor shall furnish to the Owner (2) 5-gallon car-boys containing 12.5% sodium hypochlorite solution for each chemical feed system, total of 4.

## PART 3 - EXECUTION

### 3.1 COORDINATION

- A. Coordinate with trades and other equipment to the fullest extent possible, particularly with respect to concrete structures and insets required.

- B. Provide an efficient, well coordinated arrangement without conflict or sacrifice of design.

### 3.2 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610 - Delivery, Storage, and Handling and as specified herein. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.
- B. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.
- C. Deliver spare parts at same time as pertaining equipment. Deliver to Owner after completion of work.
- D. Store and safeguard equipment, material and spare parts.
- E. Grease coat all exposed ferrous surface prior to shipping, to prevent corrosion during on site storage.

### 3.3 INSTALLATION

- A. Install chemical metering pumps and related appurtenances according to the manufacturer's printed instructions, as indicated and specified.
- B. All equipment shall be field tested in accordance with this Section of the Specifications.
- C. Equipment failing to meet specific conditions shall be removed and replaced at no additional cost to the Owner.
- D. Install identifying labels permanently to equipment.
- E. Energize no equipment except by manufacturer's serviceman, until authorized in writing.

### 3.4 WARRANTY

- A. The complete system shall be warranted to be free from defects in material and workmanship under normal and proper use and service, for a period of one (1) year after startup and acceptance by the Owner. The Contractor shall provide all labor and materials to repair or replace any defective warranted items specified in this section.
- B. This warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made under the requirements of the Contract Documents.

- C. Warranties: Submit a written warranty, executed by the Manufacturer of the equipment and the Contractor, agreeing to repair or replace components of the equipment that fail in materials or workmanship within the specified warranty period.

### 3.5 FIELD QUALITY CONTROL

- A. The Contractor shall include the coordination of field testing with a representative of the chemical feed system manufacturer to insure a complete and functioning system as part of the work. All chemical feed systems shall be calibrated prior to start-up.
- B. After field testing, the manufacturer's field representative will provide instructions for the use and care of the equipment to the Owner's representative.
- C. The chemical pumps shall be tested and calibrated in the presence of the Engineer.
  - 1. The pump manufacturer's service representative shall generate calibration curves for each chemical feed pump.
  - 2. Pump output shall be checked at 1%, 25%, 50%, 75% and 100% of the pump speed. The pumping period, volume of liquid pumped and the suction and discharge pressure shall be recorded.
  - 4. Pump operation shall be verified using the actual chemical being pumped.
- D. During field testing, the manufacturer's field representative shall inspect, test, and start-up the complete chemical feed systems. Equipment failing to meet specific conditions described herein shall be removed and replaced at no cost to the Owner.
- E. Submit field test results and certification of successfully conducted field tests.

### 3.6 TRAINING

- A. The Contractor shall provide operation and maintenance training for the chemical feed systems conducted by qualified manufacturer's service representatives. The training shall total no less than two (2) hours for each chemical feed system (not including travel time). Training shall be scheduled separately from installation checkout and testing, unless approved by Engineer.

### 3.7 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 - Contract Closeout.

END OF SECTION



## SECTION 13320

### INSTRUMENTATION & CONTROLS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. It is the intent and requirement of this project to have a single instrumentation and control system integrator/supplier (ICSI/S or Integrator) complete all the work covered under this Section of the Specifications, including: furnishing all plant, labor, equipment, instruments, devices, appliances, hardware, software, accessories, incidentals and materials, and in performing all operations in connection with the furnishing, installation, calibration, testing, certification, and training of all instruments, equipment, devices associated with the process instrumentation and control systems, complete in place, in accordance with the Specifications and Drawings.
- B. All work provided by the Integrator shall be done in harmony with the Contractor, Contractor's sub-contractors, Engineer, and Owner.
- C. All work shall be done in accordance with the National Electric Code, National Electric Safety Code, Occupational Safety and Health Administration, Underwriters Laboratories, Inc., International Society of Measurement and Control, National Electric Manufacturers Association, and all other state and local codes.
- D. Related Work
  - 1. Division 11 - Equipment
  - 2. Section 13325 - Process Instrumentation & Control Products
  - 3. Section 13400 - SCADA System
  - 4. Section 13465 - Sequence of Operations
  - 5. Division 15 - Mechanical
  - 6. Division 16 – Electrical
  - 7. The Integrator shall be available for consultation and provide direction during mechanical installation of instrumentation furnished under this Contract and during installation of conduit, raceways, power supplies, wiring, and terminations associated with instrumentation furnished under this Contract but installed by others.
- E. Related Work Not Included
  - 1. Installation of process equipment, pumps, piping, valves, fittings, and appurtenances shall be covered under Division 11.
  - 2. Electrical conduit, wiring, raceways, relays, starters, motor control centers, and variable speed drives, etc., required for operation of the equipment shall be furnished and installed under Division 16 of these specifications.
  - 3. Power connections for all electrical devices and panels furnished under this Section, including connections or disconnections to power supplies, shall be

performed under Division 16. Electrical terminations of signal wiring from applicable field devices/equipment furnished under Division 11, Division 13, Division 15, and Division 16 within the cabinets furnished and installed in this Section shall be made by the Electrical Subcontractor as directed by the Integrator.

4. Refer to paragraph 1.3 of Section 13400 for additional work not included.

## 1.2 REFERENCE STANDARDS

- A. Publications are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for a reference standard, the latest edition in effect at the time of bidding shall apply.
- B. American Petroleum Institute (API)
- C. International Society of Measurement and Control (formerly Instrument Society of America).
  1. ISA S5.4, Instrument Loop Diagrams
  2. ISA S20, Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
  3. ISA RP60.3, Human Engineering for Control Centers
  4. ISA RP60.6, Nameplates, Labels, and Tags for Control Centers
- D. National Electric Manufacturers Association (NEMA)
- E. National Fire Protection Agency (NFPA)
- F. Underwriters Laboratories, Inc. (UL)
- G. American Society for Testing and Materials (ASTM)

## 1.3 RESPONSIBILITY FOR EQUIPMENT

- A. **Scope of Work.** The Contractor shall provide the services of an instrumentation and control system integrator/supplier (ICSI/S or Integrator) who shall furnish and install all of the equipment, instruments, devices, and materials described and specified in this Section. The Integrator shall furnish and install all appurtenant materials, including specialty cables, connectors, tubing, and necessary mounting and accessory equipment to provide a complete operating system. All equipment shall be furnished as indicated on the Drawings and specified herein, or as required to insure proper system functioning.
- B. **Responsibility and Coordination.** The Contractor's attention is directed to the fact that the instrumentation is an integrated system which shall be furnished by one supplier who shall provide all of the equipment and appurtenances regardless of manufacturer. Substitutions of functions specified will be unacceptable.



- C. All of the equipment shall be of the manufacturer's latest, most modern proven design and shall, as far as practical, be of one manufacturer. Overall system and component accuracy shall be as guaranteed by the specific manufacturer.
- D. It shall be the responsibility of the Contractor to furnish a complete and fully operational system. The Drawings and Specifications are intended to include all details of a complete equipment installation, but do not purport to cover all details entered into the design of the complete system. The Contractor shall be responsible for all details which may be necessary to properly install, adjust and place in operation the complete installation. The Contractor shall assume full responsibility for additional costs which may result from unauthorized deviations or substitutions from the specifications and all requirements necessary to integrate the new systems with the Owner's existing system. An inspection of the Owner's existing SCADA and I&C systems is strongly encouraged during the bid phase.
- E. System responsibility shall be by a single instrumentation and control system integrator/supplier (ICSI or Integrator). The Integrator shall be responsible to the Contractor for: satisfactory design detail of a complete coordinated system; start-up, testing, and calibration services; integration with the Owner's existing water system facilities; ongoing operation of the Owner's existing water facilities; training; and on-site quality assurance.
- F. The Contractor shall not furnish separate equipment and attempt to assemble a system. This work is to be performed by a qualified control systems company as approved by the Engineer.

#### 1.4 QUALIFICATIONS OF INSTRUMENTATION & CONTROL SYSTEM INTEGRATOR

- A. The evaluation of qualifications of each Instrumentation and Control System Integrator/Supplier (ICSI or Integrator) will be in accordance with the following requirements, as determined by the Engineer:
  - 1. Responsiveness to each of the specific requirements, both technical and contractual.
  - 2. Documentation that demonstrates the Instrumentation and Control System Integrator is both financially and technically capable of providing and implementing the instrumentation and control system, as specified.
  - 3. The Instrumentation and Control System Integrator shall have a staffed field service department with full-time service technicians. Service technicians shall be in the direct employ of the Instrumentation and Control System Integrator, not a sub-contractor, capable of performing detailed engineering, coordination, drafting, procurement, scheduling, inspection, programming, calibration, and testing of equipment supplied. Qualification summaries and resumes of staff shall be submitted upon request.
  - 4. The Instrumentation and Control System Integrator shall provide a list of at least five (5) currently operating installations that use communications, and control systems similar to the one specified for this project.
  - 5. The Instrumentation and Control System Integrator shall provide documentation that they have built and placed into service at least 3 systems

- of similar scope within the past 60 months.
6. The final decision regarding the acceptance of the qualifications for the Instrumentation and Control System Integrator shall be that of the Engineer. Therefore, it is imperative that the Bidder understand the Contractor qualifications for the Instrumentation and Control System Integrator set forth herein, prior to submitting a Bid for this project.
  7. The following Instrumentation and Control System Integrators have been pre-qualified for this project:
    - a. **Harbor Controls**  
85 Commerce Park Rd  
North Kingstown, RI 02852  
(401) 667-0930

## 1.5 SUBMITTALS

- A. The Integrator shall submit the following in accordance with Section 01300.
  1. Qualifications Submittal: Within 15 days of the Contract Award the Contractor shall submit detailed information associated with the Integrator to be subcontracted for the project. The information shall include project references from five (5) water/wastewater projects of similar complexity (including contact information for prior projects, resumes of staff to be participating in this project, and location of staff responsible for responding to the site within four hours to resolve start-up issues). The project descriptions and references shall include an approximate value of the project and contact information (Engineer and Owner). The information shall clearly demonstrate compliance with paragraph 1.4 of this Section. The Qualifications submittal shall be submitted to the Engineer, reviewed, and approved before any further Instrumentation, Control, or SCADA system submittals will be accepted by the Engineer. Failure to meet the minimum requirements of this Section shall be grounds for rejection as an acceptable Integrator. If the Contractor's proposed Integrator is rejected, a new Integrator shall be proposed by the Contractor until the Integrator is deemed to be qualified by the Engineer.
  2. Project Plan and Schedule: a Project Plan and Schedule submittal shall be submitted within 60 calendar days of Contract Award. This submittal must be reviewed and approved by the Engineer before any further Instrumentation, Control, or SCADA system submittals will be accepted by the Engineer, and shall, as a minimum contain the following:
    - a. Overview of the proposed system.
    - b. A summary of conformance of the equipment supplied with the specifications and identification of any substitutions or deviations.
    - c. Summary of Integrators approach to the work.

- d. Plan and approach to installation, testing, calibrating, and training.
  - e. Implementation schedule that includes: equipment purchase, manufacturing, delivery, installation, testing, start-up, calibration, training, and certificate of installation.
  - f. Project personnel and organization chart for each task to be completed: design, installation, testing, calibration, training.
  - g. Proposed list of submittals including specific contents of each submittal.
3. Hardware, Panel Drawings, and Loop Drawings: the Integrator shall submit a single all-inclusive package as detailed herein. The submittal shall contain a job index sheet for all equipment, materials, and devices to be furnished, and a detailed table of contents for the submittal package. At a minimum, the submittal shall include the following.
- a. A complete system architecture diagram showing in schematic form, the interconnections between major hardware components including control centers, panels, power supplies, consoles, computer and peripheral devices, network equipment, PLCs, PLC I/O modules, HMI, and like equipment. The system architecture diagram shall be complete and shall depict all required cables, details on connection requirements, network modules, switches, communication modules, port numbers, and rack slot numbers. The intent of this submittal is for the Integrator to develop a diagram that is complete in every aspect to allow purchase of all required equipment by part number, and to allow a qualified technician to interconnect all equipment without having to refer to additional manuals or literature. The system architecture diagram shall be provided on 11 x 17 inch paper and may be shown on multiple sheets.
  - b. Component specifications, manufacturer's descriptive literature, shop drawings, and ISA-S20 data sheets for all devices/equipment being furnished. The information shall clearly indicate all pertinent design data for Engineer to evaluate conformance with the specifications. Devices shall reference the tagging convention used in the Design Documents.
  - c. Submit certified calibration data for all flow metering devices
  - d. Submit UPS system sizing calculations listing all connected and anticipated loads, battery backup times, and spare capacity
  - e. Component drawings showing dimensions, mounting and external connection details including external piping and/or wiring for all field and pipeline mounted equipment.

- f. Panel Drawings. Where panels are furnished, provide: bill of materials drawing listing each panel component; fabrication and nameplate legend drawings; internal wiring and piping schematic drawings clearly showing all equipment, terminal, and bulkhead numbers; conduit access locations; panel construction details; fabrication and painting specifications (including color); panel layout drawing showing the location of each device/component; panel wiring diagram showing all signal and power connections. Wiring diagrams to show all wire sizes, numbers, wire colors, and terminal block numbers. The drawings shall be drawn to scale and detail all equipment in and on the panel.
  - g. Loop Drawings: The Integrator shall submit detailed loop diagrams for each analog and digital loop in compliance with ISA S5.4 format. Loop drawings shall include the location of each device using a minimum of three areas (field, back of panel, front of panel), and shall show all intermediate wiring locations such as junction boxes or field termination panels. Drawings shall reflect actual wire numbers, terminal block numbers, and equipment/device tag IDs. Loop drawings shall be submitted on 11 x 17 inch paper folded to 8.5 x 11 inches.
4. Testing Plan: the Integrator shall submit a detailed testing plan describing the method and procedure for testing each loop. The procedure shall include checkoff/signoff sheets/forms for each component/device for: tag identification, installation, wiring, tubing, calibration, adjustments, and space for comments. The procedure shall include checkoff/signoff sheets/forms for each loop including panel interface terminations, I/O interface terminations, I/O signal operation, total loop operation, and space for comments. For each analog device, calibration and testing sheets shall be provided to document calibration and testing results including: scale ranges, functions, modes, interlocks, required and actual I/O signals at 25%, 50%, 75%, and 100%, and space for comments. After completion of the system installation and testing, submit a written certification that the system installation has been complete as specified, and to the satisfaction of the Integrator. The testing plan shall meet the requirements of Part 3 of this Section.
5. Training Plan: the Integrator shall submit an outline of the proposed training to be provided to the Owner's personnel. Training shall be directed to the different needs of various users of the system. At a minimum, training programs shall be developed for the following areas: basic hardware and equipment operation; system maintenance; system calibration; and basic trouble shooting. The training plan shall meet the requirements of Part 3 of this Section.
6. Final System Documentation: After approval of the system, submit six complete bound sets of final documentation manuals. The manuals shall be submitted in 3-ring binders, maximum size of 3-inches, with drawings reduced to 11 x 17 inch, then folded to 8.5 x 11 inch for inclusion. Each

section shall be uniquely numbered and separated by a binder tab. The cover and edge of each volume shall contain the Owner's name, project name, Integrator name, date, and volume number, and number of volumes. At a minimum, the submittal shall contain the following:

- a. Table of Contents
  - b. An instrument and equipment list for all devices supplied including tag numbers, manufacturer's model number, range, span, set points, manufacturer, manufacturer's telephone number, local supplier name and telephone number.
  - c. An ISA S20 data sheet for every type of device and equipment supplied.
  - d. Detailed service, maintenance, and operation instructions for each device/instrument supplied.
  - e. Complete as-built panel drawings, wiring diagrams, loop diagrams, and system architecture schematic.
  - f. The cover and edge of each volume shall contain the Owner's name, project name, Integrator name, date, and volume number, and number of volumes.
- B. Submit software discs for all licenses software to be provided

## 1.6 WARRANTY

- A. Contractor shall provide an equipment manufacturer's guarantee that the materials and/or workmanship of the equipment be free from defects for a period of one year from date of the Engineer's Letter of Substantial Completion.
- B. The Contractor shall provide, at the time of start-up, a letter certifying that the equipment has been installed properly, calibrated and is in working order suitable for operation.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. All instrumentation and electronic equipment shall be UL approved and of the manufacturer's latest proven design, utilizing printed circuitry and epoxy coating (or equal) to prevent contamination by dust, moisture and fungus. First generation equipment with less than three years general use shall have documentation on construction, operation, field test and user list.
- B. All equipment shall be suitable for operation in the environment of the project. Solid state components shall be conservatively rated for their purpose, to provide reliable

(>90%) performance over ambient atmospheric temperature between 0-140 degrees Fahrenheit and 0 to 95 percent relative humidity. All indoor control panel-located electronics shall be suitable for operation in ambient temperatures of 40 degrees F to 120 degrees F. All field electronics and outdoor panel equipment shall be suitable for operation in ambient temperatures of -40 degrees F to 140 degrees F.

- C. All electronic instrumentation shall be of the solid state type and shall utilize linear transmission signals (to and from) of isolated 4 to 20 mA DC (milliampere direct current), however, distribution within a panel or cabinet may use variable voltage (1-5 VDC – volts direct current).
- D. Outputs of equipment that are not of the standard signals outlined above shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals shall be allowed.
- E. All electronic/digital equipment shall be provided with radio frequency interference protection.
- F. All transmitter output signals shall include signal and power source isolation and boosting (as required).
- G. All receiving devices and field instruments when operating in a loop shall be of a design such that a failure of an individual device shall not affect the operation and integrity of the remaining functions or devices. All instruments and devices, either remote or panel mounted, shall have an individual, internal on-off switch.
- H. All signal converters, isolation transformers, power regulators, power converters, fuses, switches, relays, signal converters, integrators, computing devices, alarm trips, and related equipment required by the instrument manufacturers and necessary to complete the functional requirements described in the loop descriptions and shown on the drawings shall be furnished and installed by Integrator. All instruments and devices requiring an external power supply shall have an internal on-off switch.
- I. All electronic transmitting equipment shall provide loop power. True 2-wire transmitters may have loop power supplied in the receiving instrument if available or by a plug-in power supply mounted in the receiving instrument panel. A separate and isolated power supply for each device within a loop shall be supplied.
- J. All instruments and equipment shall be provided with suitable mounting hardware, floor stands, wall brackets, and instrumentation racks.
- K. All instrument air and fluid fittings and valves necessary for the operation of instruments shall be suitable and compatible for the process fluids being contacted.
- L. Nameplates (equipment tags) shall be provided on all field-mounted instruments. Nameplates shall be constructed of stainless steel. Nameplates shall be a minimum of 1.5” long times 0.75” high with 3/16” stamped letter height. Wording shall be the equipment tag id. Nameplates shall be attached to the instruments using stainless

steel screws or a stainless steel wire/band passing through a hole in the tag and secured to the instrument.

- M. The INSTRUMENT LOOP DESCRIPTIONS (SECTION 13465), PROCESS & INSTRUMENTATION DRAWINGS, AND PROCESS INSTRUMENTATION AND CONTROL PRODUCTS (SECTION 13325) indicate the intent of the process and interconnection between EQUIPMENT, INSTRUMENTATION & CONTROL PRODUCTS, INSTRUMENTS, AND DEVICES. EQUIPMENT specified in Division 11 and Division 13 does not purport to cover all equipment which may be required to complete the process intent. The equipment specified herein does not include all of the required equipment and devices necessary for a completely operational system. The Integrator shall provide all necessary equipment required in order to perform the function for the system.

## 2.2 ELECTRICAL

- A. Equipment shall operate on a 60 Hertz alternating current power source at a nominal 120 volts, plus or minus 10%, except where specifically noted. Where possible, all field instruments shall be 24 VDC loop powered. Regulators and power supplies required for compliance with the above shall be provided between power supply and interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.
- B. All switches shall have double-pole double-throw contacts rated at a minimum of 600 VA, unless specified elsewhere.
- C. All materials shall be UL listed and approved.
- D. Equipment shall be constructed (or configured) so that when a power interruption occurs, the equipment, instrument, and/or device resumes normal operation without manual resetting when power is restored, unless otherwise noted.
- E. All conductors running from the field to control panels shall be of a single, continuous length, without splices, except at approved junction boxes. Special care shall be exercised to carry grounding lines through such junction boxes with the least possible resistance. Multi-conductor cable may be used between junction boxes and control panels.
- F. All shielded cable shall be grounded at the control panel end only. Shields shall be carried through junction boxes with the least possible resistance and kept isolated from ground at these points. The field end of the shield shall be insulated to prevent grounding.
- G. All external connection points shall be made at terminal blocks with No 6-32 or larger screws.

## 2.3 EQUIPMENT

- A. Uninterruptible Power Supply

1. The Integrator shall furnish and install a true online UPS for each designated panel.
2. Uninterruptible power supplies (UPS) shall provide true on-line 120 VAC of battery backup power for 30 minutes under full load for all connected equipment. The batteries shall be sealed, maintenance free lead-acid type.
3. UPS shall meet ANSI C62.41/IEEE 578 A&B standards for transient/lighting protection. UPS shall continuously operate from the inverter (zero transfer time) and shall output a true high quality low distortion sinusoidal waveform synchronized to the AC utility.
4. UPS shall have a fail-safe transfer to bypass for UPS internal electronic failures and an appropriate electrical disconnect or provision to easily remove and by-pass the UPS.
5. UPS shall provide power conditioning to 5 percent output of nominal for input voltage 20 percent of nominal or for any load variation from no load to full load. The conditioner shall protect the system from noise, dip, spikes and planned reductions in voltage by utility companies and shall shut down if output voltage exceeds 10 percent for any reason.
6. UPS shall include a status and monitoring display for: inverter operation, high and low battery, near low battery shutdown, and overload.
7. UPS shall be as manufactured by APC, MGE, Tripp-Lite, Behlman, or approved equal.
8. UPS sizing calculations shall be provided to the Engineer for review and approval.

**B. Lighting/Surge Protection**

1. General - Lightning/surge protection shall be provided to protect the instrumentation system from induced surges propagating along the signal and power supply lines. The protection systems shall be such that the protective level shall not interfere with normal operations but shall be lower than the instrument surge withstand level, and be maintenance free and self-restoring. Instruments shall be housed in a suitable metallic case and properly grounded. Ground wires for all surge protectors shall be connected to a good earth ground and where practical each ground wire run individually and insulated from each other. These protectors shall be mounted with the instrument enclosure or a separate NEMA 4X junction box coupled to the enclosure.
2. Power Supply – Protection of all instrument power supply lines shall be provided. Cabinets, panels, and groups of field instruments shall be protected by isolation transformers and surge suppressors. Individual field instruments



shall be protected by individual gas-filled discharge tube surge suppressors (if integral units not provide with the device).

3. Communications – Protection of all communication lines shall be provided. The unit shall be back panel mounted and is to be connected between the telephone line and the telemetry and control equipment. Transient voltages above 90V line to ground or 180V line to line will cause the gas discharge tubes to short to ground. If the peak lasts more than an instant, 1/4 amp fast blow fuses will open the line.
4. Lightning/surge protection devices shall be as manufactured by Telematic, EDCO, Joslyn, MCG Electronics, Transector, or approved equal.

#### C. Relays

1. The Loop Descriptions indicate a functional description for a control system. In order to provide complete compatibility with the equipment being supplied the Integrator shall be responsible for furnishing, installing, and interfacing all relays as needed to provide a complete and operational system. Relays shall include: general purpose, control, timing, and intrinsically safe.
2. Relays shall be heavy duty, solid state electronic suitable for the installed environment and application.
3. Relays shall be functional with input voltages of 120 VAC and 24VDC and provide output voltages of 120 VAC and 24VDC, as needed. Timing relays shall provide additional output capabilities for “on” delay, “off” delay, or instantaneous.
4. Electrical relays for handling power circuits shall be solid state general purpose as manufactured by Westinghouse, Allen-Bradley, General Electric, or approved equal.
5. Relays handling light duty control, telemetering or alarm functions shall be plug-in type, complete with dust and moisture proof enclosure as manufactured by Potter & Brumfield, Square D, General Electric, or equal.

#### D. Current to Current Converters

1. Current to current converters shall transform current input signal to a proportional 4-20 mA current output signal. The unit shall be of solid state electronic circuitry sealed in a protective epoxy compound, and shall be for surface or rear of panel mounting.
2. Current to current converters shall provide signal conversion capabilities, input/output isolation and output power boosting.
3. Signal output drive capability shall be 4-20 mA into 1,000 ohms load.

4. Accuracy shall be 0.25 percent of span.
- E. 24 VDC Power Supplies
1. Integrator shall furnish and install all power supplies needed to power field instruments and devices shown on the drawings and specified herein. Power supplies shall be equipped with and on/off circuit breaker.
  2. The final requirements and exact locations for the power supplies shall be the responsibility of the Integrator. These units shall be provided and sized to handle the applied load conditions, with 25% space capacity.
  3. All power supplies shall be of the same manufacturer and of the same type.
  4. All power supplies shall be regulated and shall be suitably protected during the operation of the unit and also incorporate protection to the equipment it serves.
  5. Power supplies shall meet the following additional requirements:
    - a. Input power: 120 VAC, +/- 10 percent, 60 hertz
    - b. Output voltage: 24 VDC
    - c. Line regulation: 0.05 % for 10 volt line change, 0.15 percent for full load.
  6. Power supplies shall be as manufactured by Acopian, Sola, Lambda, Square D, or approved equal.

## 2.4 CONTROL PANELS, ENCLOSURES, CABINETS

- A. The following paragraphs describe the general requirements of control panels, enclosures, consoles, and cabinets.
- B. The Integrator shall be responsible for ensuring final enclosure sizing and panel arrangements to accommodate all required equipment for a fully integrated and operational system shown on the Contract Drawings and as specified herein and in Section 13325, Section 13400, Section 13465, and Division 16.
- C. Equipment Mounting and Arrangement.
  1. All components shall be mounted in a manner that shall permit service, adjustment, testing, and removal without disconnection, moving or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration.

2. All exterior panel mounted equipment shall be installed with suitable gaskets, faceplates, hinges, and locking devices required to maintain the NEMA rating of the panel.
3. ISA Recommended Practice RP60.3 shall be used as a guide in layout and arrangement of panels and panel mounted components.
4. Panel layouts shall be submitted to the Engineer for review and approval.

D. Nameplates and Nametags.

1. Nameplates shall be provided for all flush mounted equipment and devices. The nameplates shall be 3/32-inch thick and approximately 1-inch by 3-inch constructed of black and white laminated, phenolic material having engraved letters approximately 1/4-inch high, extending through the black face into the white layer. The letters shall be white against a black background. Nameplates shall be attached to panels by self-tapping stainless steel screws or rivets. Nameplates shall also be provided for each control panel identifying the panel and shall be located at the top center of the panel. Size of nameplate shall be as required for proper visual identification.
2. Nametags shall be provided for all equipment located mounted inside the panel. Each and every device shall be tagged with embossing tape nametags with identification reference which shall correspond to all drawings and wiring diagrams for the system. The nametags shall be neatly installed and shall be clearly visible for service and maintenance of the equipment..

E. Electrical

1. Control Panels shall receive power from the source and voltage as indicated on the Contract Drawings.
2. Control panels shall be provided with the required fuse protection. Provide a lug for grounding connection up to a No. 1/0 AWG conductor. Fuses shall not be in excess 15 amperes. Panels shall be provided with a separate main circuit breaker and electrical panelboard with individual circuit breakers for feeding equipment located within the panel.
3. All instruments and devices shall be separately fused as required to protect the equipment.
4. A plug in header with convenience outlets and flexible plug-in leads shall be supplied for each instrument power supply.
5. All wiring shall comply with local and National Electrical Code in open bundles wired to numbered terminals.
6. Connections to I/O system shall be made by terminating all field wiring on terminal strips within the panel. All wiring external to the equipment

supplied shall be run in conduit as per Division 16 specifications. It is the responsibility of the Integrator to make all terminations, including providing terminations from new equipment to existing equipment.

7. All panels shall be completely assembled and wired at the factory. All wiring shall be grouped or cabled and firmly supported to the panel. All wiring shall be completely tagged, color coded, and numbered throughout the panel. The number designation shall be the same throughout the panel and each wire shall be tagged with number strips at intervals of no less than twelve inches. Not less than 8-inch clearance shall be provided between the terminal strips and the base for conduit and wiring space.
8. Minimum permissible signal wiring insulation voltage is 600 volts, with the possible exception of shielded or other special cable as required by the manufacturer and approved by the Engineer.
9. All interconnecting wire and wiring to terminals for external connections shall be not less than No. 16 AWG copper, insulated for not less than 600 volts with a moisture and heat resistant material and flame retardant nonmetallic covering. Terminal blocks for No. 12 AWG external connections shall be furnished complete with marking strip, covers, and pressure connectors.
10. Shielded conductor pairs to control modules and analog equipment shall be brought directly to terminals provided.
11. Terminal strips shall be provided for the purpose of connecting all signal wiring. All terminal strips shall be completely labeled and numbered throughout for each and every unit. Direct inter-wiring between equipment will not be allowed. Each panel shall have at least an additional 25 percent spare terminals.
12. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6 inches of the side panel or adjacent terminal and 12 inches from the bottom of the panel. Wiring troughs shall not be filled to more than 60 percent visible fill. Wiring trough covers shall be match marked to identify placement. If component identification is shown on covers for visibility, the I.D. shall also appear on the mounting sub-panel.

#### F. Panel Enclosures

1. Panels shall be properly sized to handle all internally and externally mounted instruments, devices, equipment and ancillary components with sufficient spacing between all devices. This shall include all terminal points and separation between signal I/O points. Final panel size shall be subject to the review and approval of the Engineer.
2. Panels shall be provided with full height front access doors only.

3. Heating, cooling, dehumidification, and filtering devices shall be provided for all panels, enclosures, and cabinets to maintain internal ambient conditions within the installed equipment's environmental operating range without violating the panels NEMA rating. Minimum panel interior temperatures shall not drop below 45 degrees F or exceed 104 degrees F under any conditions
4. Storage pockets shall be provided and installed on the inside of each panel and shall be of sufficient size to hold all of the prints required to service the equipment, including but not limited to the panel wiring diagram and technical data sheets for programmable equipment.
5. Unless otherwise noted the panels shall be manufactured from cold rolled steel.
6. The panels shall be free of dents or other defects.
7. Fabricated panels shall be an angle frame. The frame and shell shall be welded construction. The panel shall be 3/16 inch thick minimum.
8. All cut-outs shall be made true and square with no ragged cuts. The finished cut-out shall be deburred, with no sharp edges. All welds shall be ground smooth and be deburred with no sharp edges. Welding on the panel face should be minimized. Adequate stiffness and support shall be provided to insure a rigid and stable structure.
9. The finished enclosure shall be properly degreased, prime painted (2 coats) and finish painted (2 coats) in accordance with the paint manufacturer's instructions, prior to the installation of equipment. The final finish shall be smooth, free of runs, and uniform in tone and thickness. Two, 1-pint containers of each color used shall be supplied with the panel for field touch up. Unless otherwise noted on the Contract Drawings or data sheets, the colors to be used shall be selected by the Owner from color chips supplied by the panel manufacturer.
10. Brushed anodized aluminum, stainless steel, and F.R.P. panels with color gel coat will not require a paint finish

G. The name, Tag Identification, and NEMA enclosure rating for the control panels to be furnished under this section shall be as follows:

<b>Name</b>	<b>Tag Id</b>	<b>Enclosure</b>
Indian Springs Well House RTU	(IS-RTU)	Wall mounted, NEMA-12
Indian Springs Filter Control Panel	(IS-FCP)	Wall mounted, NEMA-12

H. Refer to the Contract Drawings for the location of each control panel/cabinet and panel layouts for specified panels.

## I. Panel/Cabinet Components

1. All control panels shall include, make provisions for, and provide sufficient space for the following, as indicated on the Contract Drawings and specified herein:
  - UPS as specified herein and shown on the Contract Drawings.
  - One 15-amp, duplex electrical receptacle as specified in Division 16.
  - Lightning/Surge Suppression as specified herein.
  - Motor starters as specified in Division 16
  - PLC and subsystem components as specified in Section 13400
  - Operator interface terminal as specified in Section 13400 and shown on the Contract Drawings
  - Network and communication devices specified in Section 13400 and shown on the Contract Drawings
  - All other ancillary equipment required for a fully operational system as specified herein and shown on the Contract Drawings.
2. Racks, mounting hardware, and supports shall be furnished and used for the installation of all panel components. Mounting hardware shall be heavy duty, corrosion resistant, equal to stainless steel or cadmium plated.
3. All instruments, components, and devices shall be heavy duty industrial type, or equal.

## 2.5 MISCELLANEOUS EQUIPMENT

### A. Spare Parts

1. Spare parts shall be provided as a part of the start-up services during the initial start-up and phase-in period. These items shall include accessories such as fuses, electrodes, membranes, fluids, charts, ink, lights, etc. required to start-up and operate the system for a period of 60 days. These items shall be packaged in separate containers and shipped to the job site with the instruments and shall be tagged "INSTRUMENT START-UP EQUIPMENT."
2. Spare parts and accessories above and beyond those being provided for start-up services shall be provided under this Section. All spare parts shall be packaged and shipped at one time. Separate shipment of spare parts shall not be acceptable. The Engineer shall be notified of the shipment release in writing indicating that all items have been shipped. Each item shall be checked by the Engineer as being received and that all components have been provided as specified.
3. A one year supply of consumables and replacement parts required for all instruments and devices being furnished for the system. A list of spare part to be included in the one year supply of consumables and replacement parts

shall be provided to the engineer during the shop drawing approval stage. Consumables and replacement parts shall be those over and above that which have been specifically identified in this section.

4. At a minimum, spare parts shall consist of the following:
  - a. Six (6) of each type of fuse (per panel)
  - b. Two (2) of each type of relay (per panel)
  - c. One (1) of each type of power supply (per panel)

### PART 3 - EXECUTION

#### 3.1 PRODUCT HANDLING

- A. Special instructions for proper field handling and installation required by the manufacturer for proper protection shall be securely attached to each piece of equipment prior to shipment.
- B. Each package shall be tagged to identify its location, tag number, and function in the system. Identification shall be prominently displayed on the outside of the package.
- C. A permanent stainless steel or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, as given in the tabulation, shall be provided on each piece of equipment supplied under this section.
- D. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry, heated, permanent shelters and, including in-line equipment, shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired or the damaged equipment replaced by the Contractor at his own cost and expense. If any apparatus has been subject to possible exposure or injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the Contractor, or the apparatus shall be replaced by the Contractor at his own expense.

#### 3.2 INSTALLATION

- A. Instrumentation and accessory equipment shall be installed in accordance with the best field and shop practices.
- B. The workmanship shall be in accordance with the best field and shop practices for the instrument and control systems.
- C. All workmen shall be skilled in the work to which they are assigned, and all work shall be performed under an instrumentation foreman. The instrumentation foreman shall be identified to the engineer prior to construction and installation,
- D. All wiring and piping shall be constructed perfectly plumb, square, level, and true to lines and surfaces indicated, in a neat, substantial and workmanlike manner, and in such a way as to properly serve for the purpose intended. All members and parts,

upon installation, shall be properly framed, secured together, and anchored in place. All cuts shall be deburred and immediately cleaned from opposite end before connecting.

- E. All instruments shall be mounted, piped and connected in strict accordance with the manufacturer's instructions. All wall mounted panels shall be mounted 5 feet above the floor, as measured to the center of the panel, or as directed by the Engineer.
- F. All internal wiring of the panels shall be done by the panel manufactured in accordance with the drawings, and instrument manufacturer's instructions.
- G. The instrument specifications indicate the intent of the interconnections between and the type of individual instrument. The proposed equipment shall be complete with all mounting hardware and accessories to satisfy the functional requirements.
- H. All work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, the Contractor shall bear full responsibility for such violations and assume all costs arising there from.
- I. All piping to and from field instrumentation shall be provided with necessary unions, test tees and shut-offs.
- J. Interfacing fixtures shall be compatible with the equipment to which they are attached and shall comply with the applicable specifications.
- K. Coordination with the process and equipment in addition to standard quoted fixtures required to conform the instrumentation to the process shall be the responsibility of the Contractor. The instrument and control system supplier shall provide detailed information on the fixtures being supplied and the extent of the field installation required.
- L. Brackets and hangers required for mounting of equipment shall be provided as noted on and/or as required. The brackets and hangers shall be installed in a workmanlike manner and shall not interfere with any other equipment. Devices shall be resistant to corrosion from acids, bases, and oxidants, and applicable to the environment for which they are being installed.
- M. Investigate each space in the building through which equipment must pass to reach its final location. If necessary, the manufacturer shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.
- N. The shield on each process instrumentation cable shall be grounded as directed by the manufacturer of the instrumentation equipment but in no case shall more than one ground be employed for each shield.
- O. Maximum practical separation shall be maintained between signal (analog alarm, and status) conduits and power feeders and AC systems.



- P. All field conductors shall terminate at the panel terminal board. Millivolt signal wires (i.e., thermocouple) may be connected direct to the input terminals of the receiving instrument if so specified.
- Q. All signal wire terminations to field equipment and panel components shall be completed by the Integrator. Power feed terminations shall be covered under Division 16, with coordination from the Integrator.
- R. All wire ends shall be terminated with hook fork type non-split compression lugs.
- S. All wire ends shall be identified at both ends with wire markers.
- T. Installation of fiber optic cable within control panels and console assemblies shall refer to cable manufacturer's specifications for bend radius. Use cable breakout assembly as recommended by the cable manufacturer. Provide basket, strain relief as required to meet manufacturer's strain requirements.
- U. Clean and prepare surfaces on which signs and tags will be mounted prior to installation.
- V. Entry to field enclosures shall be through the back, side, or bottom (not top) with weatherproof hubs. Wiring shall enter near the terminal point and not obstruct access to removal of components.
- W. Lifting rings from cabinets/assemblies shall be removed. Hole plugs of the same color as the cabinet shall be provided and installed for the holes.

### 3.3 FACTORY TESTS

- A. The Integrator shall test all equipment at the factory prior to shipment. Unless otherwise specified in the individual specification sections, all equipment provided by the Integrator shall be tested at the factory as a single fully integrated system.
- B. At a minimum, the testing shall include the following:
  - 1. Unwitnessed factory Test (UFT)
  - 2. Witnessed Factory Tests, (WFT)
  - 3. Application Software Test (AST)
- C. Each test shall be in the cause and effect format. The person(s) conducting the tests shall initiate an input (cause) and upon the system's or subsystem's producing the correct result (effect), the specific test requirement will have been satisfied.
- D. All tests shall be conducted in accordance with prior Engineer approved procedures, forms and checklists. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.

- E. Copies of these sign off test procedures, forms and checklists will constitute the required test documentation.
- F. The Integrator shall provide all special testing materials and equipment, including all interconnecting wires and cables between equipment to be tested, required to conduct in accordance with these specifications. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment and data, provide a suitable means of simulation. Simulation tests and techniques must be clearly identified and described in the test procedures.
- G. The Integrator shall coordinate all testing with the Engineer.
- H. The Engineer reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved Test Procedures without additional cost.
- I. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.
- J. No equipment shall be shipped until the Engineer has received all test results and approved that the system is ready for shipment.
- K. Unwitnessed Factory Tests (UFT)
  - 1. The entire system except for primary elements, final control elements, and air field mounted transmitters shall be interconnected and tested to ensure the system will operate as specified. All analog and discrete input/output points not interconnected at this time shall be simulated to ensure proper operation of monitoring devices/functions and control devices/functions. The intent is for the Integrator to verify functionality of all components (e g., 100 percent I/O check to the interface terminal blocks) prior to the Integrator loading the PLC and HMI software.
  - 2. All panels, consoles and assemblies shall be inspected and tested to verify that they are in conformance with related submittals, specifications and drawings. During the tests all digital system hardware shall be operated for at least five days continuously trouble free to verify the system is capable of continuous operation
  - 3. Provide all temporary cables including fiber optic, Ethernet, CAT5e, and CAT6 necessary to connect all control system components including network and PLC control system communication modules and cables for use during factory testing.
  - 4. Provide test documentation as specified herein.
- L. Witnessed Factory Test (WFT)

1. The Integrator shall notify the Engineer in writing that the system is ready for the WFT and allow the Engineer to schedule a test date within 14 days of receipt of the "Ready To Test" letter. At the time of notification, the Integrator shall submit any revisions to the detailed test procedure previously approved by the Engineer in the project system plan.
2. Prior to start of the WFT, all previous unwitnessed test results shall have been submitted and approved by the Engineer.
3. Implicit in the scheduling of the witnessed factory test (WFT) is the assumption that the Integrator has determined through prior, unwitnessed tests and quality assurance programs that the equipment is ready for shipment.
4. The following documentation shall be made available to the Engineer at the test site both before and during the WFT:
  - a. All drawings and specifications addenda and change orders.
  - b. Master copy of the test procedure.
  - c. List of the equipment to be tested including make, model and serial number.
  - d. Design related hardware and non Owner supplied software submittal applicable to the equipment being tested.
5. All system tests specified for the unwitnessed factory test (UFT) shall be repeated. All temporary cabling provided during the UFT shall be provided for the WFT.
  - a. Perform a 100 percent check of all I/O to the interface terminal blocks and verification of all communications networks. I/O verification includes testing each analog signal at zero, ten, fifty, ninety, and one hundred percent, and each digital signal at zero and one hundred percent of range.
  - b. Test the functionality of each selector switch and push button.
  - c. Test the functionality of each indicator light and annunciator point.
  - d. Confirm accurate signaling at each analog indicator, recorder, and controller at zero, ten, fifty, ninety, and one hundred percent of range.
  - e. Test each computer to ensure system boots correctly, allows access to all system components including hard drives, disk drives, CD ROM drives, and communications networks.
  - f. The Integrator and Engineer shall jointly test each communications network link using an Engineer approved Integrator test configuration to verify successful completion of required communications paths



Integrator facilities including a minimum of free parking, restrooms, drinking water, telephone, and internet service. The Engineer shall be responsible for all of their long distance telephone charges, refreshments, and meals.

6. The Integrator shall provide copies of all shop drawings, PLC and HMI manufacturer's literature, one large table (approximately 4 foot by 8 foot for staging the HMI equipment and for Engineer working space), and two padded office style chairs. In addition, the Integrator shall supply access to a minimum of two 120 VAC, 20 amp, single phase power outlets.

### 3.4 FIELD TESTS

- A. Prior to final field connections to any of the instrument panels, the Contractor shall clean all work completed including the interior of all panels; and remove all dirt, trash, wire clippings, and foreign material. The outside of all instrument panelboards are to be cleaned, and damaged painted surfaces touched up as required to leave the equipment in an acceptable condition. This shall include all nameplates, tags, and identification of equipment and devices within or on the front of the panels.
- B. No form of energy shall be turned on to any part of the instrumentation system prior to receipt by the Engineer of a certified statement of approval of the installation from the Contractor containing his supplier's authorization for turning on energy to the system.
- C. It shall be the responsibility of the instrumentation system supplier to provide a factory trained and qualified service person from the manufacturers' of the equipment to TEST AND CALIBRATE ALL EQUIPMENT and to INSTRUCT the Contractor on EQUIPMENT INSTALLATION and the ENGINEER and OWNER on operation of the equipment.
- D. No other instrumentation system manufacturer's personnel other than those persons directly from the service department of the manufacturer of the equipment and identified in the approved Project Plan shall be acceptable to perform field testing.
- E. All tests shall be conducted in accordance with prior Engineer approved procedures, forms and checklist. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after the satisfactory completion.
- F. Signed copies of the test procedures, forms and check lists will constitute the required test documentation.
- G. Provide all special testing materials, equipment, and devices. Where ever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment and data, provide suitable means of simulation. Define these simulations techniques in the test procedures.
- H. At a minimum, field testing shall include the following:

1. Operational Readiness Test (ORT)
  2. Application Software Operational Readiness Test (ASORT)
  3. Functional Acceptance Test (FAT).
- I. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and upon the system's or subsystem's producing the correct result (effect), the specific test requirement will have been satisfied. Implicit in these testing requirements is extensive coordination between the Integrator and Engineer. The Integrator is responsible for proving that the system functions in a manual mode without the aid of the PLC/HMI software. The Integrator is also responsible for verifying all I/O is connected correctly and providing valid readings at the PLC system. The Integrator is also responsible for proving the automatic/remote functions that require PLC/HMI software.
- J. The Integrator shall coordinate all testing with the Engineer.
- K. The Engineer reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved Test Procedures with no additional cost.
- L. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.
- M. The Integrator shall furnish the services of field service engineers, all special calibration and test equipment and labor to perform the field tests.
- N. Operational Readiness Test (ORT)
1. General: Prior to the Operational Readiness Test, the entire system shall be certified (inspected, tested and documented) that it is ready for operation.
  2. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated and adjusted on a loop by loop and component by component basis by the Integrator following field installation to demonstrate and document that the system is in conformance with related submittals and these specifications.
  3. The Integrator shall maintain the Loop Status Reports and Component's Calibration sheets at the jobsite and make them available to the Engineer at any time.
  4. The Engineer reserves the right to witness and sign off on all tests conducted by the Integrator. The Engineer will review and initial all Loop Status Sheets and Component Calibration Sheets and spot check their entries periodically and upon completion of the tests. Any deficiencies found shall be corrected. Final versions of these test sheets shall be submitted to the Engineer.
- O. Application Software Operational Readiness Test (ASORT)

1. After completion of the Integrator's ORT, the Engineer shall have unrestricted access to the entire PLC system to verify the functionality of the PLC programs and HMI application. During the ASORT, the Integrator shall be on site or available within 4 hours to make any necessary repairs or equipment calibrations.
2. The Integrator shall include in their schedule sufficient time (14 calendar days) to accommodate this extended on site testing time.
3. Implicit in the scheduling of the ASORT is the assumption that the Contractor and Integrator have determined through prior quality assurance programs and successful completion of the ORT (and other tests) that all I&C equipment (furnished by the Integrator and Division 11 equipment suppliers), including control panel assemblies, networking equipment, PLC systems, networks, instruments, analyzers and other ancillary equipment is completely operational and ready for the Engineer's use.
4. During the entire ASORT, all panels and HMI equipment shall be powered fully and interconnected per the approved Integrator system architecture drawing, and ready for testing.
5. The Integrator shall provide, or coordinate with the Contractor to provide, copies of all approved shop drawings; copies of all as built drawings; PLC and HMI manufacturers literature; one large table (approximately 4 foot by 8 foot) and three padded office style chairs in a temperature controlled area.
6. The Engineer agrees to complete their required testing as rapidly as possible to minimize the disruption of the Integrator's installation schedule and other day to day activities.

P. Functional Acceptance Test.

1. Prior to the Functional Acceptance Test, the entire installed instrument and control system shall be certified by the Contractor, Integrator, and Engineer that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete and defined in the ORT and ASORT. The intent of the FAT is for all responsible parties, working together, to prove the installed system operates in accordance with the Specifications. Each party is responsible for verifying the completeness of all system components furnished, installed, configured by their respective firms or subcontractors.
2. Once the facility has been started up (as defined in 01650) and is operating, a witnessed Functional Acceptance Test shall be performed on the complete system to demonstrate that it is operating and in compliance with these specifications. Each specified function shall be demonstrated on a paragraph by paragraph, loop by loop, and site by site basis.
3. Loop-specific and non-loop specific tests shall be the same as specified under

factory testing, WFT, and AST for all Integrator activities, except that the entire installed system shall be tested and all functions demonstrated. During testing, the Integrator, applicable manufacturer's representatives, and Engineer shall be present.

4. In the event of rejection of any part or function of an Integrator furnished system or equipment supplier's system, the Integrator (or supplier as applicable) shall perform repairs or replacement within 10 days.
5. Updated versions of the documentation specified to be provided for during the Functional Acceptance Test shall be made available to the Engineer at the job site both before and during the tests. In addition, one copy of all O&M manuals shall be made available to the Engineer at the job sites both before and during testing.

### 3.5 START-UP/COMMISSIONING

- A. During the start-up and commissioning the Contractor shall provide sufficient personnel to aid with the start-up of the instrumentation and controls equipment to be provided and installed by this Contract. This shall include services to correct any faults and to make the necessary adjustments for the proper operation of the equipment and installation. No other instrumentation system manufacturer's personnel other than those persons directly from the service department of the manufacturer of the equipment and identified in the approved Project Plan shall be acceptable to perform this work.
- B. After completion of the Functional Acceptance Test, the Instrumentation and Control System shall be tested as a component of, and extension of the Full System Demonstration Test (refer to Section 01650). All furnished hardware and software shall operate for a period of 21 consecutive days, under conditions of full plant process operation, without a single non field repairable malfunction.
- C. During the Full System Demonstration Test and extended 21-day period, the Integrator and Contractor shall have available, within 4 hours of notification; personnel who have an intimate knowledge of the hardware and software furnished and installed under this Contract.
- D. While this test is proceeding, the Contractor shall have full use of the system. Only Contractor operating personnel shall be allowed to operate equipment associated with live plant processes.
- E. Any malfunction of hardware and/or software furnished under this Contract during the tests shall be analyzed and corrected by the Integrator or equipment supplier's service technician. The Engineer will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.
- F. Any malfunction attributed to the Integrator during the Full System Demonstration Test (and 21-day period) which cannot be corrected within 24 hours of occurrence, or more than two similar failures of any duration, will be considered as a non-field



repairable malfunction.

### 3.6 TRAINING

- A. The cost of training programs to be conducted with Owner personnel shall be included in the Contract price. The training and instruction shall be directly related to the system being, supplied. The Integrator is responsible for training associated with all hardware, including PLC system troubleshooting and repair, and training on PLC and HMI system software.
- B. The Integrator shall provide training in accordance with the approved training plans. The Integrator shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.
- C. The Integrator shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, such materials shall be delivered to Owner.
- D. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the system hardware.
- E. All training schedules shall be coordinated with, and at the convenience of the Owner.
- F. The Integrator shall schedule their training to allow sufficient time in the project schedule to provide training on the PLC and HMI systems software. The exact details of the Integrator training will be coordinated with the Engineer during the submittal process, and approved by the Engineer.
- G. On site (field) training shall be conducted at the Owner's designated location and shall provide detailed hands on instruction to personnel covering: system debugging, troubleshooting, maintenance procedures, calibration procedures and system operation. The training shall run at times chosen by the Owner.
- H. The Contractor shall provide organized instrumentation and control systems training to be conducted by qualified manufacturer's service representatives for operations staff totaling no less than thirty-two (32) hours. Training will include equipment startup, operation, calibration, preventative maintenance, corrective maintenance, and trouble shooting. Contractor will provide the Engineer with a proposed training schedule and outline at least 14 days prior to the proposed dates of training. Content and schedule to be approved by the Engineer. Training will only be conducted for equipment that has been completely installed, tested, calibrated, and is in acceptable working order. Training on installed equipment that has not been adequately tested and calibrated will not be acceptable.
- I. The training shall be conducted over a period of six months as follows:
  - 1. Two (2) eight-hour work days: immediately after successful completion of

- the Functional Acceptance Test.
  - 2. One (1) eight-hour work day: three months after successful completion of the Functional Acceptance Test.
  - 3. One (1) eight-hour work day: six months after successful completion of the Functional Acceptance Test.
- J. Training days (and hours) do not have to be consecutive, however the total training time shall equal thirty-two total hours as specified above. Contractor shall provide written verification to the engineer that all equipment is properly calibrated and in good working order prior to the beginning of TRAINING.

### 3.7 MANUFACTURER'S SERVICES

- A. The supervisory service of a factory-trained service engineer who is specifically trained on the type of equipment herein specified shall be provided for a period of not less than five (5) eight-hour days during construction to assist the Contractor in equipment installation; the location of sleeves; methods of installing conduit and special cable; mounting, piping, and wiring of one of each type of device; and the methods of protecting all of the equipment prior to placing it into service.
- B. Upon completion of the installation, the services of the above service engineer shall be provided for a period of not less than three (3) eight-hour days for calibration and testing as described in Section 3.4.
- C. Upon completion of the equipment calibration and testing, the services of the above service engineer shall be provided for a period of not less than thirty-two (32) hours for instruction and training as described in Section 3.6.

END OF SECTION 13320

## SECTION 13325

### PROCESS INSTRUMENTATION & CONTROL PRODUCTS

#### PART 1-GENERAL

##### 1.1 SUMMARY

- A. This Section of the Specifications includes process instrumentation and control products, instruments, devices, and accessories associated with Process Instrumentation and Control Systems.
- B. The work covered under this Section of the Specifications includes furnishing all plant, labor, equipment, instruments, devices, appliances, hardware, software, accessories, incidentals and materials, and in performing all operations in connection with the furnishing, installation, calibration, testing, certification, and training of all instruments, equipment, devices associated with the process instrumentation and control systems, complete in place, in accordance with the Specifications and Drawings, by the instrumentation and control system integrator/supplier (Integrator) as specified in Section 13320.
- C. All work provided by the Integrator shall be done in harmony with the Contractor, Contractor's sub-contractors, Engineer, and Owner.
- D. All work shall be done in accordance with the National Electric Code, National Electric Safety Code, Occupational Safety and Health Administration, Underwriters Laboratories, Inc., International Society of Measurement and Control, National Electric Manufacturers Association, and all other state and local codes.
- E. Related Work
  - 1. Division 11 - Equipment
  - 2. Division 13 – Special Construction
  - 3. Division 16 - Electrical
- F. Related Work Not Included
  - 1. Electrical conduit, relays, starters, motor control centers, and variable speed drives, etc., required for operation of the equipment shall be furnished and installed under Division 16 of these specifications.
  - 2. All electrical devices and panels furnished under this Section shall be installed under Division 16.
  - 3. Installation of process equipment, pumps, piping, valves, fittings, and appurtenances shall be covered under Division 11.

## 1.2 RESPONSIBILITY FOR EQUIPMENT

- A. Refer to Section 13320 – Instrumentation and Controls

## 1.3 WARRANTY

- A. Refer to Section 13320 – Instrumentation and Controls

## 1.4 SUBMITTALS

- A. Refer to Section 13320 – Instrumentation and Controls

## PART 2 - PRODUCTS

### 2.1 INSTRUMENTATION GENERAL

- A. All instrumentation and electronic equipment shall be UL approved and of the manufacturer's latest proven design, utilizing printed circuitry and epoxy coating (or equal) to prevent contamination by dust, moisture and fungus. First generation equipment with less than three years general use shall have documentation on construction, operation, field test and user list.
- B. All equipment and devices furnished hereunder shall be designed for continuous industrial service and shall be of modular construction capable of field expansion.
- C. All equipment shall be suitable for operation in the environment of the project. Solid state components shall be conservatively rated for their purpose, to provide reliable (>90%) performance over ambient atmospheric temperature between 0-140 degrees Fahrenheit and 0 to 95 percent relative humidity. All indoor control panel-located electronics shall be suitable for operation in ambient temperatures of 40 degrees F to 120 degrees F. All field electronics and outdoor panel equipment shall be suitable for operation in ambient temperatures of -40 degrees F to 140 degrees F.
- D. All electronic instrumentation shall utilize transmission signals (to and from) of isolated 4 to 20 mA DC, unless otherwise approved by the Engineer.
- E. All electronic/digital equipment shall be provided with radio frequency interference protection.
- F. All transmitter output signals shall include signal and power source isolation and boosting (as required).
- G. Indicators, controllers, integrators, relays, and other receiving devices when operating in a loop shall be of a design such that a failure of an individual device shall not affect the operation and integrity of the remaining functions. All indicators, either remote or panel mounted, shall have an individual, internal on-off switch.
- H. Electronic transmitting equipment shall provide loop power. True 2-wire transmitter may have its loop power supplied in the receiving instrument if available or by a plug-in power supply mounted in the receiving instrument panel.

- I. All equipment necessary to complete the functional requirements shall be supplied by the systems supplier and shall be of the same manufacturer as the controllers, indicators, and recorders unless otherwise specified (e.g. signal converters, integrator, computing devices, alarm trips, etc.).
- J. All instruments and equipment shall be provided with suitable mounting hardware, floor stands, wall brackets, panel racks, and rails.
- K. All instrument air and fluid fittings and valves necessary for operations shall be suitable and compatible for the process fluids being contacted.
- L. All necessary fuses and switches required by the instrumentation manufacturer for his equipment shall be provided with the equipment. All instruments requiring an external power supply shall have an internal on/off switch.
- M. All conductors running from the field to control panels shall be of a single, continuous length, without splices, except at approved junction boxes. Special care shall be exercised to carry grounding lines through such junction boxes with the least possible resistance.
- N. Metal nameplates shall be provided on all field-mounted elements, indicators and transmitters. Wording and sizing of nameplates shall be as described in Section 13320.
- O. Instrument Summary List:

Section	Instrumentation	Type
2.2	Flow	Magnetic Flow Meter
2.3	Pressure	Pressure Indicating Transmitter
2.4	Level	Ultra-Sonic Level Transducers and Transmitters
2.5	Analytical	Chlorine Residual

## 2.2 FLOW INSTRUMENTS

### A. Magnetic Flow Meters:

#### 1. Flow Element

- a. Type: Flow meters shall be a pulsed, direct current (DC) type volumetric liquid flow rate detector. The process transducing method shall be such that the characteristics of the water being measured shall be used to generate an induced voltage as water passes through a magnetic field. The amplitude of the voltage produced shall be directly proportional to the flow rate. The flow meter description, tag number, nominal size, and flow range are presented in the table below:

Description	Tag No.	Nominal Meter Size	Flow Range (gpm)
Well Flow Element	FE-101	2"	1-100

- b. Performance: Accuracy – within +/- 0.5% of actual flow rate with absolute zero stability, requiring no zero adjustment; Repeatability - 0.1% of full scale; Power Requirements – match to converter/transmitter; Temperature rating – minus 40 to plus 150 degrees F; Pressure rating – 150 psi; Provide RFI protection; Five pipe diameters upstream and two pipe diameters downstream maximum of straight run required for flow meter operation; Meter shall be capable of running empty indefinitely without damage to any component.
  - c. Physical: ANSI 150# RF flanged end connections, hard rubber liner (NSF 61 approved), Hastelloy C electrodes, stainless steel measuring tube, steel SAE, epoxy paint finished housing, 316 stainless steel grounding rings, and die-cast terminal box, and built-in ultrasonic electrode cleaning features.
  - d. Accessories/Options Required: Provide a certified flow curve for each meter; provide ground ring, ground wires and gaskets, as required or as otherwise noted. All materials shall be immune to chemical reaction with liquid being measured. Where insulated or non-conductive pipe is used, only orifice plate grounding rings will be acceptable.
2. Signal Converter/Transmitter
- a. Type: Instrument mounted, microprocessor based electronics w/ LCD display, matched to flow element.
  - b. Performance: Power requirements - 120 VAC, +/- 10%; power consumption no greater than 15 VA; Temperature - minus 10 to plus 140 degrees F.; Output – Isolated 4-20mA into 0 to 1000 ohms; output signal linear and proportional to flow velocity, without requirement for signal characterizing; LCD indicator, totalizer, 10 Hz scaled pulse, and integral electronics.
  - c. Physical: Housing – NEMA 4X wall mount, or integral with the device as approved by the Engineer.
  - d. Accessories/Options Required: Signal converters shall be interchangeable without recalibration for all meter sizes; a separate terminal strip for power connection shall be supplied; empty pipe zero stabilization option; separate junction box for terminal connections; attached to electronics housing.
3. Manufacturer: Khrone Enviromag 2000 with IFC 100 Signal Converter. **No substitutions shall be allowed.**

B. Flow Indicator/Totalizer

- 1. Type: Panel mounted 6-digit LED display.
- 2. Performance: Displays shall be capable of displaying instantaneous flow in gpm and totalized flow in hundreds of gallons. Displays shall be capable of automatically alternating between flow rate and totalized flow or manually selecting either flow rate

or totalized flow. Instrument shall be capable of receiving a 4-20 mA signal from external flow transmitter and determine the actual flow by squaring the signal.

## 2.3 PRESSURE INSTRUMENTS

### A. Pressure Indicating Transmitters (PIT-101 & PIT-401)

1. Type: Turret mount case with digital liquid crystal display
2. Performance/Functional: Gauge pressure range of 0 to 300 psi and an operating temperature range of -20 to 185 degrees F; Span limits - 10 and 300 psi. Transmitter accuracy of  $\pm 0.25\%$  of calibrated span and  $\pm 0.1\%$  repeatability of maximum span. Range is to be fully adjustable using allowable span and range limits.
3. Physical: All wetted parts shall be 316 stainless steel. Transmitters shall be 2 wire providing a 4-20 mA DC output signal with non-interacting zero and span adjustments. Units shall provide local indication of measured pressure with on-board configuration pushbuttons. Electric terminations shall be in a NEMA 4X enclosure provided with a terminal strip.
4. Power Requirements: 24 VDC
5. Accessories/Options: All necessary accessories required for installation and mounting shall be included.
6. Manufacturer: Foxboro, ABB, Siemens, Rosemount or Engineer approved equal.

## 2.4 LEVEL INSTRUMENTS

### A. Ultrasonic Level Transducers and Transmitters

1. Type: Ultrasonic type level transducers and integral transmitters.
2. Performance/Functional: Level monitoring system shall have a range of up to 50 feet with a resolution of  $\pm 0.1\%$  of range and a repeatability of  $\pm 25\%$  of range.
3. Bulk Chemical Storage Tank Transducers (LE/LIT-411): All level transducers shall be coordinated with the tank height and equipped with chemical isolation diaphragms suitable for the chemical in use. The wiring from the transducer to the transmitter shall be housed in conduit. One monitor transmitter shall be used per transducer.
4. Bulk Tank Monitor/Transmitter: Shall include a 4 x 1.5" multi-block LCD display with backlighting. Input: 4-20 mA from alternate device, scalable; Output: 4-20 mA output for display at the bulk chemical fill panel (sodium hydroxide only) and as an input to the SCADA system. The monitor/transmitter shall have two (2) Form C dry contacts for each tank monitored. Transducers shall be installed according to manufacturer recommendations.
5. Enclosure: NEMA 4X, wall mounted.

6. Power Required: 12 – 30 V DC supply.
7. Manufacturer: Bulk Chemical Storage Tank transducer - Siemens Model ST-H; Monitor/Transmitter - Siemens HydroRanger200; or Engineer approved equal. Day Chemical Storage Tank transducer/transmitter – Flowline EchoPod DL10; Monitor – Flowline LI25; or Engineer approved equal.

#### B. Level Switches

1. Process Tanks and Sump Pits: direct-acting, normally open, mercury-free type float switch with polypropylene housing and PVC-jacketed type SO cable of sufficient length. Float switch shall have two (2) Form C dry contacts.
2. Chemical Bulk Storage Tank and Day Tanks: Environmentally safe, containing no mercury. Switches shall be float type with DPDT mechanical switches and provide Form C dry contacts. Housing for switches shall be suitable and compatible with associated chemical tank application. Switches shall be installed at a height of 2-inches below the tank overflow elevation, and shall be adjustable within a range of  $\pm$  2-feet of the set point.
3. Manufacturer: ACT 7300 Series - Advanced Control Technology; or Engineer approved equal.

## 2.5 ANALYTICAL INSTRUMENTS

#### A. Analyzer – Chlorine Residual

1. Type: Microprocessor-based residual chlorine analyzer which shall continuously monitor free or total chlorine residual at constant sample and ambient temperatures.
2. Performance: The analyzer shall have a range of 0-5 mg/ and a minimum accuracy of  $\pm$  5% of reading or  $\pm$  0.05 mg/L, which ever is greater. The analysis method used shall be DPD colorimetric.
3. Physical/Features: Sample flow control shall be via a peristaltic pump/valve module. Chlorine concentration is determined by comparing the optical absorbance of a sample containing reagents versus a sample without reagents. Chlorine concentration is measured photometrically and displayed on a 3-digit LED readout on the front panel. The unit shall contain built-in self diagnostics for operational errors or equipment problems, provide a 4-20 mA isolated output signal, and contain adjustable outputs for remote high and low residual alarms.
4. Enclosure/Power Requirements: Instrument case shall be a corrosion-resistant NEMA 12 enclosure with clear plastic front. Power requirements shall be 120 VAC, 60Hz.
5. Accessories/Options: Necessary components for complete system shall be provided including applicable wall mounting kit, power cord, and sample tubing.



6. Manufacturer - HACH GLI P53, or Engineer approved equal.

## 2.6 MISCELLANEOUS EQUIPMENT

### A. Spare Parts

1. Spare parts shall be provided as a part of the start-up services during the initial start-up and phase-in period. These items shall include accessories such as fuses, electrodes, membranes, fluids, charts, ink, lights, etc. required to start-up and operate the system for a period of 60 days. These items shall be packaged in separate containers and shipped to the job site with the instruments and shall be tagged "INSTRUMENTION START-UP EQUIPMENT."
2. Spare parts and accessories above and beyond those being provided for start-up services shall be provided under this Section. All spare parts shall be packaged and shipped at one time. Separate shipment of spare parts shall not be acceptable. The Engineer shall be notified of the shipment release in writing indicating that all items have been shipped. Each item shall be checked by the Engineer as being received and that all components have been provided as specified.
3. A one year supply of consumables and replacement parts required for all instruments, analyzers, and devices being furnished for the system. A list of spare part to be included in the one year supply of consumables and replacement parts shall be provided to the engineer during the shop drawing approval stage. Consumables and replacement parts shall be those over and above that which have been specifically identified in this section.

## PART 3 – EXECUTION

REFER TO SECTION 13320 – PROCESS INSTRUMENTATION AND CONTROL

END OF SECTION 13325



## SECTION 13400

### SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. The work covered under this Section of the Specifications includes the furnishing of all labor, equipment, appliances and materials, and in performing all operations in connection with the furnishing, installation, testing, and training of an Integrated Control System and a computerized Supervisory Control and Data Acquisition (SCADA) system for the monitoring and control of the Prudence Island Water System Chlorination and Pretreatment system complete and in place, in accordance with the Drawings and Specifications.
- B. The SCADA system to be furnished and installed for the Water System Chlorination & Pretreatment system shall be integrated with and work in harmony with the Owner's existing SCADA systems associated with existing site facilities and off-site or remote facilities. A schematic diagram of existing and proposed SCADA systems is provided in the Contract Drawings. Control Panel drawings for the Army Camp RTU are appended to this section.
- C. It is intended that the Owner's existing water system facilities remain in full operation between May 1<sup>st</sup> and September 30<sup>th</sup> while the new facilities are under construction.
- D. The system shall be furnished and installed by an instrumentation and control system integrator/supplier (Integrator) as specified in Section 13320. The SCADA system shall be complete and ready to operate, including all necessary interconnections between field equipment and input/output cabinets, existing and new communications systems and accessories as specified or as recommended for best operation for the equipment furnished. The hardware and software to be supplied and installed as part of the SCADA system shall be readily available, fully supported by the manufacturer, and of the latest technology. None of the hardware or software systems shall be part of a line that is discontinued, to be discontinued, or classified as repair status only.
- E. The Integrator shall use the equipment, instrument, and loop numbering scheme that has been developed and shown on the Drawings in the development of all submittals.
- F. The Integrator shall furnish and install new, and modify existing devices/equipment as shown on the Instrumentation Drawings. Integrator shall furnish and install any ancillary devices, equipment, and components necessary for a complete and fully functional system. The Integrator shall notify the Engineer of any existing devices, equipment, or components which are not operational, and provide the Engineer with a cost estimate for furnishing and installing replacements for a fully functional system.
- G. The Integrator shall program as needed the existing Army Camp RTU PLC and OIT as noted in the Contract Drawings and Specifications.

- H. The Integrator shall provide all PLC programming, PLC I/O addressing, testing of PLC logic, network engineering, and computer based control system SCADA OIT programming, including graphics development, OIT software configuration, database development, and startup/training activities associated with the software portions of the SCADA PLC and OIT systems.

## 1.2 RELATED SECTIONS

- A. Division 11 – Equipment
- B. Section 13320 - Instrumentation and Controls
- C. Section 13325 – Process Instrumentation & Control Products
- D. Section 13465 - Sequence of Operations
- E. Division 16 - Electrical

## 1.3 RELATED WORK NOT INCLUDED

- A. Electrical conduit, relays, raceways, starters, motor control centers, etc., required for operation, control, and monitoring of equipment shall be furnished and installed under Division 16 of these specifications.
- B. The power connections to all electrical devices and panels furnished under this Section shall be performed under Division 16.

## 1.4 SYSTEM DESCRIPTION

- A. The SCADA System to be supplied under this Contract consists of a programmable logic controller (PLC) network, operator interface equipment, software, communications equipment, and all ancillary/auxiliary equipment, peripherals, devices, and spare parts specified or required to assemble and operate a complete and fully functional system.
- B. Panel mounted PLC(s) shall contain logic for monitoring and control of instrumentation and the ability to send and receive information via the PLC network at the Indian Springs Water System Chlorination & Pretreatment site. An existing stand-alone RTU SCADA panel and network exists at the Army Camp site, and shall be programmed in accordance with the Contract Documents.
- C. The discrete (digital) and analog (variable) inputs and outputs for the SCADA system are shown on the Contract Drawings and tabulated at the end of this Section. A description of the process control logic for the facilities is contained in Section 13465 – Sequence of Operations. System process and instrumentation diagrams are provided in the Contract drawings.

## 1.5 SUBMITTALS

- A. Submit the following in accordance with the Conditions of Contract and the Division 1 Specification Sections.
- B. Product Data: Provide catalog sheets and technical data sheets to indicate the physical data and electrical performance, electrical characteristics, and connection requirements, including the manufacturer and model number of each software and hardware item.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitation of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting.
- D. Submit Manufacturer's programming manuals.
- E. SCADA system architecture drawing showing all SCADA system components, devices, and connectivity.
- F. Operation and Maintenance Manuals: The Integrator shall furnish clear, typewritten easy-to-understand, tightly bound instruction manuals as specified in Division 1, for daily operation and maintenance of the system. Specifically, the manuals shall contain explicit instructions and well-diagrammed procedures for system operations, display generation, report generation, and system maintenance. The instruction manuals shall include as a minimum the following information:
  - 1. Description of system operation, editing, and troubleshooting.
  - 2. Configuration language description.
  - 3. Configuration disks.
  - 4. Names, addresses, and telephone numbers of local hardware and software representatives.
- G. Refer to Section 13320 for additional submittal requirements pertaining to this Section.

## 1.6 QUALITY ASSURANCE

- A. The materials and equipment covered in this specification are intended to be standard materials and equipment of proven ability as manufactured by reputable concerns. The control and monitoring system shall be designed and constructed in accordance with the best practice of the industry and shall be installed in accordance with the manufacturer's recommendations and these Specifications. The Specifications call attention to certain features but do not purport to cover all details entering into the design and installation of the SCADA system. The Contractor shall be responsible for furnishing and installing any necessary peripheral devices required to achieve a fully functioning SCADA system as described herein.

## 1.7 WARRANTY

- A. The SCADA system supplier shall guarantee that the materials and workmanship of the

equipment and software be free from defects for a period of one year from date of start-up, providing the equipment has been installed, operated, and maintained in accordance with the manufacturer's recommendations.

- B. The Integrator shall provide, at the time of start-up of the facility, a letter certifying that the equipment has been installed properly, calibrated and is in working order suitable for operation.
- C. The Integrator shall prepare detailed design information, procure, configure, prepare graphics, install, start-up, make ready for use, the complete instrumentation's systems as indicated in these Specifications. These Specifications and drawings include descriptions of functional operation and performance, as well as standards, but do not necessarily enumerate detailed specifications for all components and devices which are essential for system operation. However, all components and devices shall be furnished and installed as required to provide complete and operable systems for accomplishing the functions and meeting the performance set forth hereinafter.
- D. The Integrator shall assume full responsibility for the compatibility and interfacing the controls provided under this specification section, and compatibility and interfacing the controls provided under Division 11 and Division 13. A letter attesting to this responsibility shall be furnished at the time of start-up in addition to the certification required under Section 1.7B.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. The system to be furnished and installed shall be in regular production with pre-designed hardware and software for process control, SCADA, and communications systems.
- B. The SCADA system shall be a standard system. Custom one of a kind application software and customized hardware components will not be accepted. A standard system is defined as one which is available, at time of bid, with fully tested hardware and software, full documentation, and prepared training classes such that no development must be done beyond system configuration.
- C. The Integrator shall be responsible for detailed engineering, planning, installation, assembly, testing, programming, start-up and demonstration of all equipment and specified software programs to provide a complete operating system.
- D. All equipment supplied shall be of the most current and proven design at the time of delivery. Specifications and drawings call attention to certain features, but do not purport to cover all details entering into the design of the completed SCADA. The completed System and the equipment provided by the Integrator shall be compatible with the functions required and shall be a complete working System.

### 2.2 PROGRAMMABLE LOGIC CONTROLLER SYSTEM

- A. PLCs shall be intelligent devices that: perform both data acquisition and process control

functions for field and panel mounted instruments, devices, and equipment; capable of recording and storing data and performing internal mathematical calculations; and, support a variety of input/output (I/O) modules capable of collecting data and sending commands to field and panel mounted instruments, devices, and equipment.

- B. PLCs shall have built in self diagnostic capabilities and be able to communicate with both a host processor and other PLCs as part of an Ethernet network.
- C. Each PLC shall have the ability to function independently; that is, perform its functions without the need for commands from a host processor.
- D. The PLC system shall be capable of supporting the following communications protocols: Ethernet, Modbus Plus, and Serial communications.
- E. The PLC shall be solid state, modular, and field expandable allowing the system to be tailored to meet the specified application. The design and installation shall have the capacity to allow for expansion of the system by the addition of hardware and/or software.
- F. The PLC system shall be capable of handling the required number of process I/O as shown on the drawings, plus 20% active spares (for each type of I/O), plus the capacity to accommodate 20% future (for each type of I/O) by adding I/O modules.
- G. The PLC shall be designed, manufactured, and tested to the latest applicable NEMA, IEC, ANSI, and IEEE standards. The PLC shall meet or exceed the surge withstand capability standards as defined in IEEE C37.90A for all inputs and outputs. The PLC shall also meet or exceed the ICS 2-230 industry standard for RFI immunity.
- H. Each PLC system shall include, but not be limited to a chassis, central processing unit (CPU), I/O modules, communication modules, remote interface modules, and power supply to facilitate a fully operational system as show on the Contract Drawings and described in the Specifications.
- I. The PLC and all of its components shall be capable of operating in the ambient temperature range of 32 to 140 degrees F and shall function continuously in the relative humidity range of 5% to 95% non-condensing.
- J. All PLC equipment shall have a minimum factory warranty of 3 years.
- K. All components of the PLC shall be by the same Manufacturer and have the following agency approvals: UL; CSA; FM Class I, Division 2.
- L. Manufacturer: Prudence Island Water District has standardized their PLC systems. All Control Panel PLC system components shall be as manufactured by Allen Bradley to match existing SCADA system components and maintain efficient operation and maintenance. Any remote PLC I/O systems proposed by the Integrator shall be as manufactured by Allen Bradley: Micrologix Controller 1400 or CompactLogix. **No substitutions shall be allowed.**

M. Central Processing Unit (CPU)

1. The CPU shall scan inputs, perform all system logic, conduct on-line diagnostics, communicate with other devices, and control the outputs. Diagnostics shall include memory checks, communications monitoring, I/O bus monitoring, watchdog timing, and user program validation. If an I/O module fault is detected, the CPU shall turn off that module.
2. The CPU shall be a self contained unit and shall provide executive program execution, relay ladder logic program execution and support remote and local programming. The CPU shall provide I/O scanning and inter-processor and peripheral communication functions.
3. The CPU front panel shall include a RJ-45, 10/100 Base T Ethernet port.
4. The CPU front panel shall include, but not be limited to, the following LED status indicators:
  - a. CPU Run Mode
  - b. CPU Fault Status
  - c. I/O Status
  - d. Battery Status
  - e. Communication with a remote device via the inter-processor communications link
5. The front panel of the CPU shall include a mounted key switch with the following control functions:
  - a. Run - No control logic edits possible, executing program
  - b. Program - Programming allowed, program execution disabled
  - c. Remote - Programming terminal can make edits and change processor mode, including test mode, whereby the logic executes and inputs are monitored, but edits are not permanently active unless assembled.
6. A minimum of 16K of 16-bit words of internal, solid state memory shall be provided for storage of the control program and the data table.
7. Program and data table back up shall be battery-backed RAM and flash memory.
8. Program functions shall include standard functions: contacts, coils, timers, counters, math functions (add, subtract, multiply, divide), shift registers, bit and work operations, and advanced functions: floating point math calculations including integer to floating point conversion, floating point to integer conversion, add, subtract, multiply, divide, square root, compare, and trigonometric functions.
9. Program functions shall include PID closed loop and cascaded PID loop control. The PID loop shall perform the following functions:



- a. Output tracking for bumpless transfer between auto and manual mode
  - b. Reset windup limiting
  - c. Process variable alarming
  - d. Output preloading or bias
  - e. Adjustable rate filtering
  - f. Adjustable solution time base of 0.1 to 20 seconds
10. The CPU shall include an integral real-time clock, backed up by an internal lithium or long term type battery, which can be accessed from the control program. The clock shall include functions for time of day (year, month, day, hour, minute, second, and day of the week), alarm, and operation hours counter. The clock shall also accommodate daylight savings time adjustments.
  11. The CPU shall permit changing ladder program and data values while running.

N. Chassis

1. The chassis shall be panel mounted and of the universal type, compatible with the installed equipment.
2. It shall be possible to replace modules without disturbing field wiring.
3. The chassis shall be designed and installed to provide for free airflow convection cooling. No internal fans or other means of cooling, except heat sinks, shall be permitted.

O. Input/Output

1. I/O modules shall be capable of accepting switch contacts, solid state switch, and high level logic inputs: 4-20 mA, 1-5 VDC, thermocouple, RTD, and pulse rate analog inputs; and shall provide momentary, latched contact, or 4-20 mA analog outputs as required.
2. All modules shall be enclosed in rugged plastic, or metallic housings.
3. I/O modules shall have faceplates which shall be marked or labeled to identify module type, and in accordance with the Contract Drawings.
4. Slot covers shall be provided and installed for all unused I/O chassis slots.
5. Each analog I/O loop and each discrete I/O circuit shall be individually isolated through the use of single circuit fuse terminal blocks, so that failure within one component will not interrupt other components. Fuses shall be properly rated for each I/O point per manufacturer's recommendation.
6. Each I/O module shall contain a visual indicator to display On/Off status of the individual I/O points.
7. It shall be possible to remove and replace a module without disturbing field

wiring.

8. Discrete Inputs

- a. Discrete input modules shall provide power to field dry contacts. Contact inputs shall be optically isolated.
- b. Each input circuit shall be designed to withstand transients and surges without damage. Input circuits shall be tested to IEEE Standard C37.90 surge withstand capability.
- c. The PLC shall convert contact inputs into minimum 16-bit data words.
- d. Light emitting diodes, one adjacent to each pair of input terminals, shall be provided to indicate a Closed Contact, Conduction transistor switch, a Low positive logic level, or AC line voltage On condition.

9. Discrete Outputs

- a. Discrete output modules shall be capable of providing relay dry contact outputs in either momentary (pulsed), or latched (sustained) mode to control 120 VAC.
- b. All AC contact output circuits shall include fuses. Dry contact output contacts shall be rated a minimum 5 amps at 120 VAC.
- c. Output failure mode shall be selectable so that upon system failure all outputs shall be placed in the non-conducting mode, or remain as prior to failure.

10. Analog Inputs

- a. Analog input modules shall accept 4-20 mA DC differential inputs from field mounted transmitters and equipment. Common mode input protection of 30 VDC minimum shall be provided.
- b. If required, the analog input module shall also be capable of providing 24 VDC power for loop powered field transmitters.
- c. Input signal conversion shall be a minimum of 12-bits (11 data bits plus 1 sign bit).
- d. Input accuracy shall be +/- 0.1% of full scale input span.

11. Analog Outputs

- a. Analog output modules shall convert 12-bit (11 data bits plus 1 sign bit) data into a proportional, isolated 4-20 mA DC analog output signal.
- b. Output load drive capability shall be a minimum of 600 ohms for each output.
- c. Accuracy shall be +/- 0.1% of full scale output span.
- d. Response to system failure shall be selectable such that upon failure the output shall either remain at the last value, or go to zero (4 mA), as required by the process.

P. Power Supply

1. The PLC system shall have a modular power supply that mounts directly to the I/O chassis and can be easily serviced or replaced.
2. The power supply shall automatically shut down the PLC system whenever its output current is detected as exceeding 125% of its rated capacity.
3. The PLC power supply shall be capable of operating from a nominal electrical service of 85 to 132 VAC, single phase, and in the frequency range of 47 to 63 hertz.

Q. PLC Programming Support Software

1. One licensed copy of the software necessary to program the PLC system shall be provided under this Section. The software shall be capable of being installed on a notebook computer. A copy of the original application specific PLC program on diskette/CD ROM shall be provided to the Owner with all of the necessary licensing requirements for the Owner to own and maintain the software. All of the necessary cables for each type of connection associated with the PLC system suitable for a portable programmer shall also be supplied. Programming software shall be RSLogix 500.
2. The software shall include a menu driven package for programming using ladder logic and allow for periodic execution of tasks. Tasks consist of a number of blocks or sub-routines that will be referred to as “modules”. By using various combinations of modules, it shall be possible to build a task that performs any process control or data acquisition function as required for a fully operational system and described in the Contract Drawings and Specifications. A variety of modules shall be provided, as indicated herein.
  - a. Arithmetic (add, subtract, multiply, divide, square root)
  - b. Average
  - c. Logic and Boolean operations (less than, greater than, equal to), if, then, else
  - d. Differentiator
  - e. Integrator
  - f. Multiplexor
  - g. Demultiplexor
  - h. Function/lookup table
  - i. Lead/lag
  - j. Minimum/maximum identifier
  - k. PID controller
  - l. Sequencer
  - m. Timer
  - n. Track/hold
3. Editing, addressing, and searching features
  - a. Mouse based
  - b. Allow cut and paste operations

- c. Address & Symbol search
- d. Search and replace operation
- e. Automatic symbolic address assignment

4. I/O configuration & monitoring

- a. I/O configuration of base unit with optional modules
- b. I/O monitoring

5. Diagnostics and Troubleshooting.

- a. Real time data table monitoring

6. Reporting and Utilities.

- a. Ladder logic
- b. Cross reference
- c. Data table dump
- d. Data table usage
- e. Unused addresses
- f. Base with optional module description
- g. Program revision history
- h. Program upload/download
- i. Security access controls

7. The power supply shall automatically shut down the PLC system whenever its output current is detected as exceeding 125% of its rated capacity.

R. Auxiliary Equipment

1. Spares shall be provided for each component in the PLC system as follows:

- a. A total of one (1) CPU (for each type furnished and installed).
- b. A total of two (2) discrete I/O modules for each type furnished and installed.
- c. A total of two (2) analog I/O modules for each type furnished and installed.
- d. A total of two (2) power supplies for each type furnished and installed.
- e. A total of two (2) communication modules for each type furnished and installed.
- f. A total of one (1) type of Ethernet switch for each type furnished and installed.
- g. A total of one (1) modem for each type furnished and installed.
- h. One of each type of cable and necessary cable adapters suitable for longest cable run.

2. The PLC system shall be provided with a CD containing an electronic copy of the programming software.

## 2.3 NETWORK COMMUNICATION DEVICES

- A. PLC Ethernet communications module: Allen Bradley Controllers to be furnished with built in Ethernet communications port or module for network communications consisting of a RJ45 port capable of 10/100 Mbps.
- B. Ethernet Switches: Ethernet switches shall be provided for SCADA network communications as shown on the Contract Drawings and have a sufficient number of RJ45 ports to support its function, have one spare port, and have no fewer than 4 ports. Each port shall be autosensing and automatically adapt to either 10 or 100 Mbps Ethernet.
  - 1. The Ethernet switch shall be self-contained unit capable of 24-hour per day unattended operation.
  - 2. The Ethernet switch connections shall support the following network standards:
    - a. IEEE.802.3 10 Base-T
    - b. IEEE.802.3u 100 Base-T
    - c. IEEE.802.1d Spanning Tree
    - d. IEEE.802.1w Rapid Spanning Tree
    - e. IEEE.802.1q VLAN
    - f. IEEE.802.1p Class of service (CoS)
  - 3. The Ethernet switch shall have a minimum of 512k or buffer and an 8k MAC address table.
  - 4. The Ethernet switch shall have LED indicators for power, 10/100 Mbps, and LNK/ACT.
  - 5. The Ethernet switch shall be smart (managed switch) and determine the Ethernet addresses used on each network segment and build a table as packets are passed through the switch.
  - 6. The Ethernet switch shall have both command-line interface which allows scripting and a secure management interface which supports SNMPv3.
  - 7. The switches shall be deployed in a “ring” type fault tolerant design using a software-based recovery enhancement solution to achieve recovery times of less than one second following a break in the ring connection. The software must allow for inclusion of 3rd party switches and must be capable of running on any of the industrial switches.
  - 8. The Integrator shall furnish and install all necessary accessories and ancillary equipment/materials required for complete operation of the unit, including Ethernet cables, fiber optic cables, power supply, power adapters, and mounting hardware.
  - 9. The Ethernet switch shall have a manufacturer’s warranty of not less than 3

years.

10. Manufacturer: the Ethernet switches shall be as manufactured by Moxa Technologies, Cisco, Black Box, N-Tron, or approved equal.

## 2.4 PANEL MOUNTED OPERATOR INTERFACE

- A. Operator interface shall be a front panel mounted video control panel with 10” (diagonal) color CRT with display resolution of 800 x 600 SVGA, 18-bit color graphics. Operator interface shall be panel mounted as indicated on the Contract Drawings. Interface shall be PanelView Plus 7 as manufactured by Allen Bradley, or approved equal.
- B. Operator interface shall be provided with communication ports for RS-232 communications and Ethernet/IP communications, and two USB ports for mouse and keyboard support.
- C. Operator interface shall have forty (40) control buttons arranged in an array. A numerical keypad shall be integral to the unit and combination touch screen. The instruments function keys shall permit the entry of database parameters without any external device.
- D. Programming shall be via manufacturer supplied state of the art and present day software.
- E. Process parameters shall be displayed via the following standard software templates: indicator, readout, bar graph, maintenance window, table, display, alarm window, standard trend, and advanced trend.
- F. Memory shall be sufficient to provide up to 20 screens with each screen handling 10 displays of templates as well a 5 variable input states. Additionally, up to 500 messages shall be stored.
- G. Screens shall include an alarm summary status and source of last 100 alarms.
- H. Configured screens shall include the summary and status of all non-alarm SCADA input and output variables defined in this Section and on the Contract Drawings. Summary status screens shall be organized based on the following general categories:
  1. System Overview – flow, pressure, screen selector
  2. Filter System Overview – flow, differential pressure, valve status
  3. Filter Operations – run status, run time, backwash control (initiate, start, stop, sequencing), backwash pump (start/stop), valve control (open/close)
  4. Chlorine Feed Systems – day tank weight, pump operation (hand/remote; on/off),
  5. Chlorine Residual Measurements
  6. Alarm Status and Setpoints
  7. Trend graphs for analog inputs (flow, pressure, level, chlorine residual)
- I. Operator interface shall provide custom graphics for each of the loop descriptions and controls. Some loops shall require several screens to be configured for the loop being described.

- J. Communication between operator interface and PLC shall be via Ethernet
- K. Operator interface shall incorporate a modular design for ease of maintenance and provide password protection along with page lockout. Power requirements shall be 115 VAC.
- L. OIT screens shall be developed by the Integrator and shall include custom graphics for all non-alarm SCADA input and output variables and status summary of the last 100 alarms defined in Division 13 and shown on the Contract Drawings. SCADA OIT screens shall be organized based on the following general categories:
  - 1. Water System Chlorination & Pretreatment Overview (flows, pressures, backwash tank level, analyzer readings).
  - 2. Chemical Feed sub-screen (pump controls, mode, set points, timers, flow status, day tank volume/weight).
  - 3. Analyzer sub-screen (analyzer readings and alarm set points).
  - 4. Trends sub-screen (flows, pressures, levels, analyzer readings, and pump run status).
  - 5. Alarm setpoint screen for operator adjustable alarm setpoints and operator selectable alarm delay set points.
  - 6. OIT SCADA screens shall be prepared based on the following:
    - a. Each screen shall be set up with similar toolbars along the top and bottom of the screen.
    - b. The top toolbar shall include objects that will return the operator to the previous screen, the next screen and the overview screen.
    - c. The bottom toolbar shall include the date and time, and number of active alarms.
    - d. The top toolbar shall include an object that will take the operator to the alarm screen when selected.
    - e. All points received by the system, digital and analog shall be displayed at least once in a manner approved by the Engineer.
    - f. All operator level set points shall be displayed and editable on the operator level screens.
    - g. Each set point shall be configured with a corresponding security level that will not allow manipulation if the operator's security level is below that assigned to the set point.
    - h. Motors running will be colored red and motors off will be colored green.

- i. Motors starting will be flashing red – determined by a motor being called to run and the feedback that the motor is running has not been received yet.
- j. Motors stopping will be flashing green – determined by a motor being called to stop and the feedback signal indicating the motor is running is still being received.
- k. Valves with status feedback to the SCADA software shall be red when open, green when closed and yellow if neither limit switch has been reached.
- l. Alarms for a piece of equipment will be indicated in both the alarm window/screen and will also change that piece of equipment to a flashing yellow.
- m. Each screen shall be drawn such that it appears as the facility is actually built. Water flow across the screens shall be from left to right, similar to that shown in the Contract Drawings (I sheets).
- n. Section views for system screens shall be used where it is determined that the plan view cannot adequately show the information.
- o. The Water System Chlorination & Pretreatment overview screen shall be set up such that the existing Main System Overview screen and all Water System Chlorination & Pretreatment sub-screens are selectable, and once selected, that screen will appear.
- p. Analog displays shall include a description by name and the value of the parameter. The number of decimal places to use should be verified with the Owner/operator to determine the best choice for the application.
- q. The Integrator shall modify existing OIT screens at the Army Camp site as needed and prepare new OIT screens at both the Indian Springs site and Army Camp site. New SCADA OIT screens at the Army Camp site shall generally conform to arrangement and likeness (text height, color schemes, animations, etc.) of the existing SCADA OIT screens.

### PART 3 - EXECUTION

#### 3.1 PRODUCT HANDLING

- A. Special instructions for proper field handling and installation required by the manufacturer for proper protection, shall be securely attached to each piece of equipment prior to shipment.
- B. Each package shall be tagged to identify its location, tag number, and function in the system. Identification shall be prominently displayed on the outside of the package.
- C. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry permanent shelters and shall be adequately protected against mechanical injury. If any apparatus has



been damaged, such damage shall be repaired or the damaged equipment replaced by the Contractor at his own cost and expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the Contractor, or the apparatus shall be replaced by the Contractor at his own expense.

3.2 INSTALLATION

- A. Refer to Section 13320, Instrumentation and Controls.

3.3 START-UP, TESTING, AND TRAINING

- A. Refer to Section 13320, Instrumentation and Controls.

3.4 MANUFACTURER'S SERVICES

- A. Refer to Section 13320, Instrumentation and Controls.

3.5 I/O SIGNAL COUNT

- A. Refer to the pages that follow.

3.6 I/O Alarms

- A. Refer to Contract Drawings

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Indian Springs RTU		
Signal Description	Type	Number
Indian Springs Well Flow Mag Meter (FIT-101)	AI	1
Indian Springs Well Pump Pressure Indicating Transmitter (PIT-101)	AI	1
Indian Springs NaOCL Day Tank Weight (WIT-501)	AI	1
NaOCl Metering Pumps (P-501, P-502) - Speed Set Point	AO	2
NaOCl Metering Pumps (P-501, P-502) - Tube Failure	DI	2
NaOCl Metering Pumps (P-501, P-502) - On/Off	DI	2
NaOCl Metering Pumps (P-501, P-502) - Start/Stop	DO	2
<b>Totals</b>	<b>AI</b>	<b>3</b>
	<b>AO</b>	<b>2</b>
	<b>DI</b>	<b>4</b>
	<b>DO</b>	<b>2</b>
Indian Springs Filter Control Panel		
Signal Description	Type	Number
Filter Differential Pressure Transmitter (DPIT-201A, DPIT-201B)	AI	2
Filter Influent Mag Meter (FIT-201A, FIT-201B)	AI	2
Finished Water Cl2 Analyzer (AIT-401)	AI	1
Finished Water Pressure Indicating Transmitter (PIT-401)	AI	1
Backwash Tank Level Transmitter (LIT-301)	AI	1

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	AO	
	AO	
Backwash Waste Valve Limit Switch (ZSO202A - ZSO202C) - Open	DI	2
Backwash Waste Valve (FV202A - FV202C) - Mode in Auto	DI	2
Backwash Waste Valve Limit Switch (ZSC202A - ZSC202C) - Closed	DI	2
Draindown Air Valve Limit Switch (ZSC222A - ZSC222C) - Closed	DI	2
Draindown Air Valve (FV222A - FV222C) - Mode in Auto	DI	2
Draindown Air Valve Limit Switch (ZSO222A - ZSO222C) - Open	DI	2
Draindown Valve (FV204A - FV204C) - Mode in Auto	DI	2
Draindown Valve Limit Switch (ZSC204A - ZSC204C) - Closed	DI	2
Draindown Valve Limit Switch (ZSO204A - ZSO204C) - Open	DI	2
Emergency WWS Valve Limit Switch (ZSC902) - Closed	DI	1
Filter Effluent Valve (FV203A - FV203C) - Mode in Auto	DI	2
Filter Effluent Valve Limit Switch (ZSC203A - ZSC203C) - Closed	DI	2
Filter Effluent Valve Limit Switch (ZSO203A - ZSO203C) - Open	DI	2
Filter Influent Control Valve (FC-201A, FC-201B) - Mode in Auto	DI	2
Filter Influent Control Valve Limit Switch (ZSC201A - ZSC201C) - Closed	DI	2
Filter to Waste Valve (FV205A - FV205C) - Mode in Auto	DI	2
Filter to Waste Valve Limit Switch (ZSC205A - ZSC205C) - Closed	DI	2
Filter to Waste Valve Limit Switch (ZSO205A - ZSO205C) - Open	DI	2
Finished Water Valve (FV903) - Mode in Auto	DI	1
Finished Water Valve Limit Switch (ZSC903) - Closed	DI	1
Finished Water Valve Limit Switch (ZSO903) - Open	DI	1
NaOCl Day Tank Level Switches (LSH-505A - 505B)	DI	2
NaOCl Metering Pumps (P506A - P506C) - Hand Mode	DI	4
NaOCl Metering Pumps Flow (P506A - P506C) - No Flow	DI	2
Slow Fill Valve (FV206A - FV206C) - Mode in Auto	DI	2
Slow Fill Valve Limit Switch (ZSC206A - ZSC206C) - Closed	DI	2
Slow Fill Valve Limit Switch (ZSO206A - ZSO206C) - Open	DI	2
Well Pump #2 (P102) - Run Status	DI	1
Backwash Waste Valve (FV202A - FV202C) - Open/Close	DO	2
Draindown Air Valve (FV222A - FV222C) - Open/Close	DO	2
Draindown Valve (FV204A - FV204C) - Open/Closed	DO	2
Filter Effluent Valve (FV203A - FV203C) - Open/Close	DO	2
Filter to Waste Valve (FV205A - FV205C) - Open/Closed	DO	2
NaOCl Metering Pump (P506A-P506C) - Start	DO	2
Finished Water Valve (FV903) - Open/Close	DO	1
Slow Fill Valve (FV206A - FV206C) - Open/Close	DO	2
	<b>Totals</b>	
	<b>AI</b>	<b>7</b>
	<b>AO</b>	<b>0</b>
	<b>DI</b>	<b>53</b>
	<b>DO</b>	<b>15</b>

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<b>Army Camp RTU - New Signals Only</b>		
<b>Signal Description</b>	<b>Type</b>	<b>Number</b>
Army Camp NaOCL Day Tank Weight (WIT-502)	AI	1
Finished Water Cl2 Analyzer (AIT-402)	AI	1
NaOCl Metering Pumps (P-503, P-504) - Speed Set Point	AO	2
NaOCl Metering Pumps (P-503, P-504) - Tube Failure	DI	2
NaOCl Metering Pumps (P-503, P-504) - On/Off	DI	2
NaOCl Metering Pumps (P-503, P-504) - Start/Stop	DO	2
	<b>Totals</b>	
	AI	2
	AO	2
	DI	4
	DO	2

## SECTION 13465

### SEQUENCE OF OPERATIONS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.

##### 1.2 SUMMARY

- A. This specification has been developed to describe a basic functional description of each process by means of a loop description. These function descriptions shall act as a reference for the Contractor and I&C Integrator.
- B. The loop descriptions are intended to provide for system operation. The loops specified under this section describe the general system operating requirements and may not include all required control interlocks or safety shutdowns required based on actual process equipment supplied. The control system supplier shall be responsible for coordinating the actual requirements with the individual equipment manufacturers and providing all control and safety equipment required. Coordinate final loop descriptions with Engineer and equipment manufacturers.
- C. Revise all process control strategies within 90 days following initial startup as directed by the Engineer and/or the Owner to reflect changes in the process control.
- D. Related Sections: The following sections contain requirements that relate to this Section:
  - 1. Division 1 - General Requirements
  - 2. Division 11 - Equipment
  - 3. Division 13 - Special Construction
  - 4. Division 16 - Electrical

##### 1.3 SUBMITTALS

- A. Submit the following in accordance with the Conditions of Contract and Division 1 Specification Sections and as specified herein.
- B. Submit flow diagrams for the programming of the PLCs.
- C. Submit PLC ladder logic including cross-reference tables, I/O listings, tag names and database configurations.
- D. Submit PLC to SCADA system translation tables including cross-reference tables, I/O listings, tag names and database configurations.

## 1.4 OPERATIONS AND MAINTENANCE INSTRUCTION MANUALS

- A. Operation and Maintenance Manuals: Submit materials for inclusion in Operating and Maintenance Manuals specified in Division 1.

### PART 2 – PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 SEQUENCE OF OPERATIONS

- A. A summary of alarm conditions is provided in Specification Section 13400 and shown on the Contract Drawings. A summary of equipment interlocks is provided on the Contract Drawings.

- B. Well Pump:

The existing well pumps will be interlocked with the new equipment as shown on the Instrumentation Drawings.

- C. Sodium Hypochlorite Chemical Feed System

##### Day Tank

Sodium hypochlorite will be stored in 5 gallon pails on a chemical containment pallet. The pail in use will be placed on a scale (WIT-501 & WIT-502) to monitor chlorine use. The chlorine weight is displayed locally and in the SCADA system. Alarm conditions will be reported to the SCADA system for low weight.

##### Chemical Feed Pumps

Sodium hypochlorite is paced based on the well water flow rate as measured by the source water meters (FE-101 and existing FE-102). The NaOCl chemical feed pumps (ISMP-1, ISMP-2, ACMP-1, and ACMP-2) draw the chemical from the day tank pail and pump it to the injection point. The chemical feed pumps are equipped with integral mode start/stop controls. Automatic or Manual control of the pumps will be selected by hand switches (HS-501A, B, C, and D). The pumps can be operated using the SCADA system (direct 4-20 mA signal) or manually using the integral pump controls. The pump motor speed can be set manually or remotely by the SCADA system. Each metering pump shall be supplied with a tube failure sensor that is capable of electrically signaling a tube failure condition and providing an alarm output to the SCADA system. A no-flow or tube failure signal shall shut down the pump in addition to being relayed to the SCADA system to indicate an alarm event. A no-flow condition at the well water flow meter will also shut down the chemical feed pumps.

Each pair sodium hypochlorite chemical feed pump will be provided with a duplex receptacle for power. The pump shall be plugged into the receptacle for both AUTO and HAND service. The outlet will be electrically interlocked with the well pump and the feed pumps will be flow paced based on the water flow.

D. Filtration System:

Normal Forward Flow

Open inlet and effluent valves for on-line filter.  
Close valves to backwash tank.  
Close inlet and effluent valves for stand-by filter

Backwash:

Close inlet and effluent valves for filter to be backwashed.  
Open backwash valves.  
Drain down the filter.  
Turn on backwash pump for 15 minutes, then turn off.  
Close the backwash valves.  
Rinse the filter for 2 minutes.  
Place the filter in stand-by.

E. Analyzers:

Finished Water Chlorine Residual

A residual chlorine analyzer will be used to measure free of the finished water. The chlorine residual level (via AIT-401 & AIT-402) is displayed locally and on the SCADA system. Alarm conditions will be reported to the SCADA system for high-high, high, low-low, and low chlorine residual. The alarm set-points and interlocks shall be operator adjustable.

F. Pressure Transmitter:

Pressure transmitter (PIT-121) measures, locally indicates, and transmits pressure both to a local display and the SCADA system. Alarm conditions will be reported to the SCADA system for high-high, high, low-low, and low pressure. The alarm set-points shall be operator adjustable.

G. Interlocks:

Refer to Instrumentation Sheet I-1 of the Contract Drawings and other Sections of Division 13 – Special Construction for equipment interlocks.

H. Alarms

Refer to Instrumentation Sheet I-1 of the Contract Drawings and Specification Section 13400 for a summary of alarms.

END OF SECTION





## SECTION 13600

### PRECAST CONCRETE BUILDING

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. Contractor to furnish a precast concrete building. Building to be field assembled by the manufacturer on the contractor's poured-in-place foundation as indicated on contract drawings and in accordance with manufacturer's recommendations. The precast concrete building shall be made up of 2 modules and joined together on site.

##### 1.2 QUALITY ASSURANCE

- A. ACI-318-02, "Building Code Requirements for Reinforced Concrete". Concrete Reinforcing Institute, "Manual of Standard Practice".
- B. ANSI/ASCE-7-02 "Building Code Requirement for Minimum Design Loads in Buildings and Other Structures".
- C. IBC 2015, 1996 BOCA
- D. Concrete Reinforcing Institute, "Manual of Standard Practice".
- E. UL-752 test method level 4 for bullet resistance certified by an independent structural engineer.
- F. Fabricator must be a certified producer/member of The Precast/Prestressed Concrete Institute (PCI), National Precast Concrete Association (NPCA) or equal.
- G. Building fabricator must have a minimum of 5 years experience manufacturing and setting transportable precast concrete buildings.

##### 1.3 DESIGN REQUIREMENTS

- A. Building Dimensions:

Exterior – 24' x 24' x 11'-11", interior: 23'-4" x 23'-4" x 11'-0"

- B. Design Loads:
1. Seismic load performance category 'C', Exposure Group III
  2. Standard Live Roof Load – 60 PSF
  3. Standard Floor Load – 250 PSF
  4. Standard Wind Loading – 130 MPH
- C. Gabled Roof: Roof panel shall slope approximately 24” from left to right or front to back in the short-sided direction. The roof shall extend a minimum of 6” beyond the wall panel all around. Provide turndown feature to prevent water migration into the building along top of wall panels. Roof shall have an integral architectural ribbed edge.
- D. Roof, floor, and wall panels must each be produced as single component monolithic panels. No roof, floor, or vertical wall joints will be allowed, except at corners. Wall panels shall be set on top of floor panel.
- E. Floor panel must have ½” step-down around the entire perimeter to prevent water migration into the building along the bottom of wall panels.

#### 1.4 SUBMITTALS

- A. Engineering calculations that are designed and sealed by a professional engineer, licensed in Rhode Island, shall be submitted for approval.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. The precast concrete building shall to be EASI-SET® brand as manufactured by Shea Concrete Products, Amesbury MA or approved equal. Building to be provided by manufacturer with all necessary openings as specified by contractor in conformance with manufacturer’s structural requirements.
- B. Concrete: Steel-reinforced, 5000 PSI minimum 28-day compressive strength, air-entrained (ASTM C260).
- C. Reinforcing Steel: ASTM A615, grade 60 unless otherwise specified.

- D. Post-tensioning Strand: 41K Polystrand CP50, .50, 270 KSI, 7-wire strand, enclosed within a greased plastic sheath, (ASTM A416). Roof and floor to be each post-tensioned by a single, continuous tendon. Said tendon shall form a substantially rectangular configuration having gently curving corners wherein the positioning of the cable member results in a pattern of one or more loops and a bisecting of the loop(s). The cable member starts from one corner of the concrete building panel, forms a gentle perimeter loop(s) returning to a point where the cable member entered the concrete building panel. The tendon then turns 90 degrees and follows the cable member(s) to a point midway along the “Y” axis of the concrete building panel and then turns 90 degrees along the “X” axis of the concrete building panel. This bisects the concrete building panel and crosses the opposite parallel portion of the cable member and exits from an adjacent side of the concrete building panel.
1. If post-tensioning is not used in the roof panel, the following guidelines must be followed to ensure a watertight roof design.
    - a. The entire precast concrete roof panel surface must be cleaned and primed with a material that prepares the concrete surface for proper adherence to the coating material.
    - b. The entire precast concrete roof panel surface shall be sealed with a .045 EPDM continuous membrane cemented to the concrete with a compound designed for this purpose.
- E. Caulking: Joint between building and floor slab shall be caulked on the exterior and interior surface of the joints. Caulking shall be SIKAFLEX-1A elastic sealant or equal. Exterior caulk joint to be 3/8” x 3/8” square so that sides of joint are parallel for correct caulk adhesion. Back of joint to be taped with bond breaking tape to ensure adhesion of caulk to parallel sides of joint and not the back.
- F. Vents: Two screened aluminum vents to be cast in rear wall. Vents shall be SUNVENT #164FL or equal.
- G. Panel Connections: All panels shall be securely fastened together with 3/8” thick steel brackets. Steel is to be of structural quality, hot-rolled carbon complying with ASTM A283, Grade C and hot dipped galvanized after fabrication. All fasteners to be 1/2” diameter bolts complying with ASTM A307 for low-carbon steel bolts. Cast-in anchors used for panel connections to be Dayton-Superior #F-63, or equal. All inserts for corner connections must be secured directly to form before casting panels. No floating-in of connection inserts shall be allowed.

- H. Interior Wall and Ceiling Facing: All interior walls and ceilings shall be outfitted with the following panel coverage to a nominal thickness of 4 inches:
1. Metal Z-Furring Channels: spaced 16" on center equal to 3" 25 gauge galvanized steel Z-Channels as manufactured by Clark-Dietrich, or approved equal.
  2. Insulation Board: 3" rigid closed-cell extruded polystyrene, ASTM C578 Type IV, 25 psi minimum, long term aged R-value of 5 per inch.
  3. Plywood Sheathing: 4x8 Plywood APA 3/4" A-B Marine-Grade sheathing, as detailed in Voluntary Product Standard PS 1-95 Construction and Industrial Plywood.
    - a. Species: Douglas-fir or Western Larch.
    - b. Span Rating: Not less than 24/0.
    - c. Nominal Thickness: Not less than 3/4-inch.
    - d. Provide fasteners of size and type to comply with materials and manufacturer.
  4. Fiberglass Reinforced Plastic (FRP) Panels: Class C, FiberLite FRP Wall Panels (LP-F9 for walls and LP-S9 for ceilings) as manufactured by Nudo, or approved equal. Thickness: 0.09". Color to be selected by Owner.
  5. Vinal Cover Wall Trim – Armstrong flooring, 4" PVC vinyl wall based molding. Color to be selected by Owner.

## 2.2 ACCESSORIES

- A. Doors and Frames: Shall comply with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI-100) and as herein specified. The buildings shall be equipped with (1) double 3'-0" x 6'-8" x 1-3/4" and (1) single 3'-0" x 6'-8" x 1-3/4", 18-gauge galvanized/insulated Dominion Imperial right hand reverse metal doors with 16-gauge galvanized frames and weather stripping. Doors and frames shall be bonderized and painted one coat of rust inhibitive primer and one finish coat of enamel paint; color shall be Yorktown Brown unless otherwise specified.
- B. Door Hardware:
1. Handle: Lindstrom stainless steel, 8-1/2" x 2" or equal.
  2. Hinges: PB-31/NRP/26D 4 1/2" x 4 1/2" (chrome-plated with non-removable hinge pins), 3 per door or equal.
  3. Lock Set: PDQ Industries KR116 – 32D (stainless steel finish) or equal.

4. Surface Bolt, Upper: Cal-Royal 045901426D (satin chrome finish) or equal.
5. Surface Bolt, Lower: Cal-Royal 045901426D (satin chrome finish) or equal.
6. Astragal: A4441/68R or equal.
7. Threshold: National Guard 897V60 raised interior, extruded aluminum threshold with neoprene seal or equal.
8. Door Holder: Glynn-Johnson 904H US32D (stainless steel finish), overhead slide type surface mounted door holder or equal.
9. Drip Cap: National Guard 15D72 or equal.
10. Door Stop: Ives 445B26D (Inactive leaf only) or equal.

C. Windows:

1. Fixed transom windows – as shown on the Contract Drawings.
2. A series as manufactured by Andersen, or approved equal.
3. Furnish and install weathertight flashing for watertight and leakproof seal.

## 2.3 FINISHES

A. Interior of Building: refer to paragraph 2.1.H - FRP panels on all interior surfaces.

B. Exterior of Building: Architectural precast concrete brick finish: Finish must be imprinted in top face of panel while in form using an open grid impression tool similar to EASI-BRICK™. Finished brick size shall be 2 3/8" x 7 5/8" with vertical steel float or light broom finish. Joints between each brick must be 3/8" wide x 3/8" deep. Back of joint shall be concave to simulate a hand-tooled joint. Each brick face shall be coated with the following acrylic concrete stain: 1) Cementrate by FOSROC; or, 2) Canyon Tone stain by United Coatings. Stain color shall be Brick Red unless specified otherwise. Stain shall be applied per manufacturer's recommendation. Joints shall be kept substantially free of stain to maintain a gray concrete color.

## PART 3 – EXECUTION

### 3.1 SITE PREPARATION

- A. The precast concrete building shall be placed on the concrete foundation. Contractor shall place crushed stone to 1" above highest point of area where building will be placed and at least 1'-0" wide all around the building footprint. Retain stone or sand with a perimeter form to prevent the material from washing out.
- B. Stone shall be a minimum of 4" thick or down to firm subgrade. Stone shall be 3/8" or smaller and must be screeded level within 1/4" in both directions. Stone shall be placed within a perimeter form with flat and level top edge for screeding. Forming material shall remain around stone until after the building is set.
- C. Provide positive drainage for the fill, concrete pad, or slab as required.

### 3.2 ACCESS

Contractor must provide a level unobstructed area large enough for a crane and a tractor-trailer to park adjacent to the pad. Crane must be able to place outriggers within 5'-0" of edge of pad and truck and crane must be able to get side by side under their own power. No overhead lines may be within 75' radius of center of pad. Firm roadbed with turns that allow 65' lowbed tractor-trailer must be provided directly to site. No building shall be placed closer than 2'-0" to an existing structure.

SECTION 15020

VENTILATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.1.1 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-  
CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 62.1	(2013) Ventilation for Acceptable Indoor Air Quality
ASTM INTERNATIONAL (ASTM)	
ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A924/A924M	(2016a) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B117	(2016) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B766	(1986; R 2015) Standard Specification for Electrodeposited Coatings of Cadmium
ASTM C1071	(2016) Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)
ASTM C553	(2013) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C916	(2014) Standard Specification for Adhesives for Duct Thermal Insulation
ASTM D1654	(2008; R 2016) Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D3359	(2009; E 2010; R 2010) Measuring Adhesion by Tape Test
ASTM D520	(2000; R 2011) Zinc Dust Pigment
ASTM E2016	(2015) Standard Specification for Industrial Woven Wire Cloth

ASTM E84	(2016) Standard Test Method for Surface Burning Characteristics of Building Materials
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)	
NEMA MG 1	(2016) Motors and Generators
NEMA MG 10	(2013) Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors
NEMA MG 11	(1977; R 2012) Energy Management Guide for Selection and Use of Single Phase Motors
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 701	(2015) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
NFPA 90A	(2015) Standard for the Installation of Air Conditioning and Ventilating Systems
SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)	
SMACNA 1819	(2002) Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems, 5th Edition
SMACNA 1966	(2005) HVAC Duct Construction Standards Metal and Flexible, 3rd Edition
SMACNA 1981	(2008) Seismic Restraint Manual Guidelines for Mechanical Systems, 3rd Edition
U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)	
40 CFR 82	Protection of Stratospheric Ozone
UNDERWRITERS LABORATORIES (UL)	
UL 181	(2013) Factory-Made Air Ducts and Air Connectors
UL 555	(2006; Reprint Aug 2016) UL Standard for Safety Fire Dampers
UL 6	(2007; Reprint Nov 2014) Electrical Rigid Metal Conduit-Steel
UL 723	(2008; Reprint Aug 2013) Test for Surface Burning Characteristics of Building Materials
UL Bld Mat Dir	(2012) Building Materials Directory
UL Fire Resistance	(2014) Fire Resistance Directory

## 1.2 SUMMARY OF WORK

A. The work covered under this Section of the Specifications includes the following:

1. Furnish heating, air-conditioning, ventilation and exhaust equipment, ductwork, ductwork, offsets, fittings, and accessories as required to provide a complete installation. Coordinate the work of the different trades to avoid interference between piping, equipment, structural, and electrical work. Provide complete, in place, all necessary offsets in piping and ductwork, and all fittings, and other components, required to install the work as indicated and specified.

B. Related Sections include the following:



1. Division 0 – Bidding and Contract Requirements
2. Division 1 – General Requirements
3. Division 16 - Electrical
4. Section 15070 - Thermal Insulation for Mechanical Systems
5. Section 15300 - Basic Mechanical Materials and Methods

C. Work included:

1. The contractor shall be responsible for the following:
  - i. Furnish ductwork ventilation systems as indicated on contract drawings.
  - ii. Furnish ductwork, offsets, fittings, and any other accessories as required to provide a complete installation and to eliminate interference with other construction.

### 1.3 COORDINATION

A. The contractor shall coordinate with the following:

1. Installation of ductwork insulation being provided under Section 15070 - Thermal Insulation for Mechanical Systems
2. Electrical power being provided under Division 16.

### 1.4 Mechanical Equipment Identification

- A. The number of charts and diagrams shall be equal to or greater than the number of mechanical equipment rooms. Where more than one chart or diagram per space is required, mount these in edge pivoted, swinging leaf, extruded aluminum frame holders which open to 170 degrees.
- B. Charts: Provide chart listing of equipment by designation numbers and capacities such as flow rates, pressure and temperature differences, heating and cooling capacities, horsepower, pipe sizes, and voltage and current characteristics.
- C. Service Labeling: Label equipment, including fans, air handlers, terminal units, etc. with labels made of self-sticking, plastic film designed for permanent installation. Labels shall match naming conventions on mechanical schedules.

### 1.5 SUBMITTALS

- A. Submit the following in accordance with the Conditions of the Contract and Division 1 Specifications and as specified herein:
  1. Shop Drawings
    - i. Detail Drawings
  2. Product Data
    - i. Motorized dampers
    - ii. Fan Coils and Heat Pumps

- iii. Test Procedures
  - iv. Diagrams
3. Test Reports
- i. Performance Tests
4. Certificates
- i. Bolts
  - ii. Ozone Depleting Substances
  - iii. Manufacturer's Instructions
5. Manufacturer's Installation Instructions
- i. Operation and Maintenance Training
6. Operation and Maintenance Data
- i. Operation and Maintenance Manuals
  - ii. Exhaust Fans

#### 1.5.1 Detail Drawings

- A. Submit detail drawings showing equipment layout, including assembly and installation details and electrical connection diagrams; ductwork layout showing the location of all supports and hangers, typical hanger details, gauge reinforcement, reinforcement spacing rigidity classification, and static pressure and seal classifications. Include any information required to demonstrate that the system has been coordinated and functions properly as a unit on the drawings and show equipment relationship to other parts of the work, including clearances required for operation and maintenance. Submit drawings showing bolt-setting information, and foundation bolts prior to concrete foundation construction for all equipment indicated or required to have concrete foundations. Submit function designation of the equipment and any other requirements specified throughout this Section with the shop drawings.

#### 1.5.2 Test Procedures

- A. Submit proposed test procedures and test schedules for the performance tests of systems, at least 2 weeks prior to the start of related testing.

#### 1.6 QUALITY ASSURANCE

- A. Except as otherwise specified, approval of materials and equipment is based on manufacturer's published data.
  - 1. Where materials and equipment are specified to conform to the standards of the Underwriters Laboratories, the label of or listing with reexamination in UL Bld Mat Dir, and UL 6 is acceptable as sufficient evidence that the items conform to

Underwriters Laboratories requirements. In lieu of such label or listing, submit a written certificate from any nationally recognized testing agency, adequately equipped and competent to perform such services, stating that the items have been tested and that the units conform to the specified requirements. Outline methods of testing used by the specified agencies.

2. Where materials or equipment are specified to be constructed or tested, or both, in accordance with the standards of the ASTM International (ASTM), the ASME International (ASME), or other standards, a manufacturer's certificate of compliance of each item is acceptable as proof of compliance.
3. Conformance to such agency requirements does not relieve the item from compliance with other requirements of these specifications.

## 1.7 OTHER REQUIREMENTS

### 1.7.1 Prevention of Corrosion

- A. Protect metallic materials against corrosion. Manufacturer shall provide rust-inhibiting treatment and standard finish for the equipment enclosures. Do not use aluminum in contact with earth, and where connected to dissimilar metal. Protect aluminum by approved fittings, barrier material, or treatment. Ferrous parts such as anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and miscellaneous parts not of corrosion-resistant steel or nonferrous materials shall be hot-dip galvanized in accordance with ASTM A123/A123M for exterior locations and cadmium-plated in conformance with ASTM B766 for interior locations.

### 1.7.2 Asbestos Prohibition

- A. Do not use asbestos and asbestos-containing products.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect stored equipment at the jobsite from the weather, humidity and temperature variations, dirt and dust, or other contaminants. Additionally, cap or plug all pipes until installed.

## 2 PART PRODUCTS

### 2.1 IDENTIFICATION PLATES

- A. In addition to standard manufacturer's identification plates, provide engraved laminated phenolic identification plates for each piece of mechanical equipment. Identification plates are to designate the function of the equipment. Submit designation with the shop drawings. Identification plates shall be three layers, black-white-black, engraved to show white letters on black background. Letters shall be upper case. Identification plates 1-1/2-inches high and smaller shall be 1/16-inch thick, with engraved lettering 1/8-inch high; identification plates larger than 1-1/2-inches high shall be 1/8-inch thick, with engraved lettering of suitable height. Identification plates 1-1/2-inches high and larger shall have beveled edges. Install identification plates using a compatible adhesive.

## 2.2 ELECTRICAL WORK

- A. Provide motors, controllers, integral disconnects, contactors, and controls with their respective pieces of equipment, except as indicated as being provided under Division 16.

## 2.3 ANCHOR BOLTS

- A. Provide anchor bolts for equipment placed on concrete equipment pads or on concrete slabs. Bolts to be of the size and number recommended by the equipment manufacturer and located by means of suitable templates. Installation of anchor bolts shall not degrade the surrounding concrete.

## 2.4 PAINTING

- A. Paint equipment units in accordance with approved equipment manufacturer's standards unless specified otherwise. Field retouch only if approved. Otherwise, return equipment to the factory for refinishing.

## 2.5 INDOOR AIR QUALITY

- A. Provide equipment and components that comply with the requirements of ASHRAE 62.1 unless more stringent requirements are specified herein.

## 2.6 DUCT SYSTEMS

### 2.6.1 Metal Ductwork

- A. Provide metal ductwork construction, including all fittings and components, that complies with SMACNA 1966, as supplemented and modified by this specification.
  1. Provide radius type elbows with a centerline radius of 1.5 times the width or diameter of the duct where space permits. Otherwise, elbows having a minimum radius equal to the width or diameter of the duct or square elbows with factory fabricated turning vanes are allowed.
  2. Provide sealants that conform to fire hazard classification specified in Section THERMAL INSULATION FOR MECHANICAL SYSTEMS and are suitable for the range of air distribution and ambient temperatures to which it is exposed. Do not use pressure sensitive tape as a sealant.
  3. Make spiral lock seam duct, and flat oval with duct sealant and lock with not less than 3 equally spaced drive screws or other approved methods indicated in SMACNA 1966. Apply the sealant to the exposed male part of the fitting collar so that the sealer is on the inside of the joint and fully protected by the metal of the duct fitting. Apply one brush coat of the sealant over the outside of the joint to at least 2 inch band width covering all screw heads and joint gap. Dents in the male portion of the slip fitting collar are not acceptable. Fabricate outdoor air intake ducts and plenums with watertight soldered or brazed joints and seams.

## 2.7 AIR SYSTEMS EQUIPMENT

### 3 PART EXECUTION

#### 3.1 EXAMINATION

- A. After becoming familiar with all details of the work, verify all dimensions in the field, and advise the Owner's Representative of any discrepancy before performing the work.

#### 3.2 INSTALLATION

- A. See DUCTWORK CONSTRUCTION SCHEDULE on contract drawings for material types, pressure class and seal class to be used and their required locations.
  - 1. Install materials and equipment in accordance with the requirements of the contract drawings and approved manufacturer's installation instructions. Accomplish installation by workers skilled in this type of work. Perform installation so that there is no degradation of the designed fire ratings of walls, partitions, ceilings, and floors.
  - 2. No installation is permitted to block or otherwise impede access to any existing machine or system. Install all hinged doors to swing open a minimum of 120 degrees. Provide an area in front of all access doors that clears a minimum of 3 feet. In front of all access doors to electrical circuits, clear the area the minimum distance to energized circuits as specified in OSHA Standards, part 1910.333 (Electrical-Safety Related work practices) and an additional 3 feet.
  - 3. Except as otherwise indicated, install emergency switches and alarms in conspicuous locations. Mount all indicators, to include gauges, meters, and alarms in order to be easily visible by people in the area.

##### 3.2.1 Equipment and Installation

- A. Provide frames and supports for tanks, compressors, pumps, valves, air handling units, fans, coils, dampers, and other similar items requiring supports. Floor mount or ceiling hang air handling units as indicated. Anchor and fasten as detailed.

##### 3.2.2 Metal Ductwork

- A. Install according to SMACNA 1966 unless otherwise indicated. Install duct supports for sheet metal ductwork according to SMACNA 1966, unless otherwise specified. Do not use friction beam clamps indicated in SMACNA 1966. Anchor risers on high velocity ducts in the center of the vertical run to allow ends of riser to move due to thermal expansion. Erect supports on the risers that allow free vertical movement of the duct. Attach supports only to structural framing members and concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchor from puncturing the metal decking. Where supports are required between structural framing members, provide suitable intermediate metal framing. Where C-clamps are used, provide retainer clips.

##### 3.2.3 Insulation

- A. Provide thickness and application of insulation materials for ductwork, piping, and equipment according to Section THERMAL INSULATION FOR MECHANICAL SYSTEMS.

### 3.3 CUTTING AND PATCHING

- A. Install work in such a manner and at such time that a minimum of cutting and patching of the building structure is required. Make holes in exposed locations, in or through existing floors, by drilling and smooth by sanding. Use of a jackhammer is permitted only where specifically approved. Make holes through masonry walls to accommodate sleeves with an iron pipe masonry core saw.

### 3.4 CLEANING

- A. Thoroughly clean surfaces of piping and equipment that have become covered with dirt, plaster, or other material during handling and construction before such surfaces are prepared for final finish painting or are enclosed within the building structure. Before final acceptance, clean mechanical equipment, including piping, ducting, and fixtures, and free from dirt, grease, and finger marks. When the work area is in an occupied space such as office, laboratory or warehouse protect all furniture and equipment from dirt and debris. Incorporate housekeeping for field construction work which leaves all furniture and equipment in the affected area free of construction generated dust and debris; and, all floor surfaces vacuum-swept clean.

### 3.5 PENETRATIONS

- A. Provide sleeves and prepared openings for duct mains, branches, and other penetrating items, and install during the construction of the surface to be penetrated. Cut sleeves flush with each surface. Place sleeves for round duct 15 inches and smaller. Build framed, prepared openings for round duct larger than 15 inches and square, rectangular or oval ducts. Sleeves and framed openings are also required where grilles, registers, and diffusers are installed at the openings. Provide one inch clearance between penetrating and penetrated surfaces except at grilles, registers, and diffusers. Pack spaces between sleeve or opening and duct or duct insulation with mineral fiber conforming with ASTM C553, Type 1, Class B-2.

#### 3.5.1 Sleeves

- A. Fabricate sleeves, except as otherwise specified or indicated, from 20 gauge thick mill galvanized sheet metal. Where sleeves are installed in bearing walls or partitions, provide black steel pipe conforming with ASTM A53/A53M, Schedule 20.

#### 3.5.2 Framed Prepared Openings

- A. Fabricate framed prepared openings from 20 gauge galvanized steel, unless otherwise indicated.

#### 3.5.3 Insulation

- A. Provide duct insulation in accordance with Section THERMAL INSULATION FOR MECHANICAL SYSTEMS continuous through sleeves and prepared openings except firewall penetrations. Terminate duct insulation at fire dampers and flexible connections. For duct handling air at or below 60 degrees F, provide insulation continuous over the damper collar and retaining angle of fire dampers, which are exposed to unconditioned air.

- B. Closure Collars
- C. Provide closure collars of a minimum 4 inches wide, unless otherwise indicated, for exposed ducts and items on each side of penetrated surface, except where equipment is installed. Install collar tight against the surface and fit snugly around the duct or insulation. Grind sharp edges smooth to prevent damage to penetrating surface. Fabricate collars for round ducts 15 inches in diameter or less from 20 gauge galvanized steel. Fabricate collars for square and rectangular ducts, or round ducts with minimum dimension over 15 inches from 18 gauge galvanized steel. Fabricate collars for square and rectangular ducts with a maximum side of 15 inches or less from 20 gauge galvanized steel. Install collars with fasteners a maximum of 6 inches on center. Attach to collars a minimum of 4 fasteners where the opening is 12 inches in diameter or less, and a minimum of 8 fasteners where the opening is 20 inches in diameter or less.
- D. Firestopping
  - A. Where ducts pass through fire-rated walls, fire partitions, and fire rated chase walls, seal the penetration with fire stopping materials.

### 3.6 IDENTIFICATION SYSTEMS

- A. Provide identification tags made of brass, engraved laminated plastic, or engraved anodized aluminum, indicating service and item number on all valves and dampers. Provide tags that are 1-3/8 inch minimum diameter with stamped or engraved markings. Make indentations black for reading clarity. Attach tags to valves with No. 12 AWG 0.0808-inch diameter corrosion-resistant steel wire, copper wire, chrome-plated beaded chain or plastic straps designed for that purpose.

### 3.7 TESTING, ADJUSTING, AND BALANCING

- A. The requirements for testing, adjusting, and balancing are specified in Section TESTING, ADJUSTING AND BALANCING FOR HVAC. Begin testing, adjusting, and balancing only when the air supply and distribution, including controls, has been completed, with the exception of performance tests.

### 3.8 PERFORMANCE TESTS

- A. After testing, adjusting, and balancing is complete as specified, test each system as a whole to see that all items perform as integral parts of the system and temperatures and conditions are evenly controlled throughout the building. Record the testing during the applicable season. Make corrections and adjustments as necessary to produce the conditions indicated or specified. Conduct capacity tests and general operating tests by an experienced engineer. Provide tests that cover a period of not less than 7 days for each system and demonstrate that the entire system is functioning according to the specifications. Make coincidental chart recordings at points indicated on the drawings for the duration of the time period and record the temperature at space thermostats or space sensors, the humidity at space humidistats or space sensors and the ambient temperature and humidity in a shaded and weather protected area.
- B. Submit test reports for the performance tests in booklet form, upon completion of testing. Document phases of tests performed including initial test summary, repairs/adjustments made, and final test results in the reports.

### 3.9 CLEANING AND ADJUSTING

- A. Thoroughly clean ducts, plenums, and casing of debris and blow free of small particles of rubbish and dust and then vacuum clean before installing outlet faces. Wipe equipment clean, with no traces of oil, dust, dirt, or paint spots. Provide temporary filters prior to startup of all fans that are operated during construction and install new filters after all construction dirt has been removed from the building, and the ducts, plenums, casings, and other items specified have been vacuum cleaned. Maintain system in this clean condition until final acceptance. Properly lubricate bearings with oil or grease as recommended by the manufacturer. Tighten belts to proper tension. Adjust control valves and other miscellaneous equipment requiring adjustment to setting indicated or directed. Adjust fans to the speed indicated by the manufacturer to meet specified conditions. Maintain all equipment installed under the contract until close out documentation is received, the project is completed, and the building has been documented as beneficially occupied.

### 3.10 OPERATION AND MAINTENANCE

#### 3.10.1 Operation and Maintenance Manuals

- A. Submit 4 manuals at least 2 weeks prior to field training.

#### 3.10.2 Operation and Maintenance Training

- A. Conduct a training course for the members of the operating staff as designated by the Owner's Representative. Make the training period consist of a total of 8 hours of normal working time and start it after all work specified herein is functionally completed and the Performance Tests have been approved. Conduct field instruction that covers all of the items contained in the Operation and Maintenance Manuals as well as demonstrations of routine maintenance operations. Submit the proposed On-site Training schedule concurrently with the Operation and Maintenance Manuals and at least 14 days prior to conducting the training course.

### 3.12 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 – Contract Closeout

END OF SECTION 15020



SECTION 15070

THERMAL INSULATION FOR MECHANICAL SYSTEMS

1 PART GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.1.1 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. At the discretion of the Owner, the manufacturer of any material supplied will be required to furnish test reports pertaining to any of the tests necessary to assure compliance with the standard or standards referenced in this specification.

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-  
CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP (2010) Energy Standard for Buildings Except Low-Rise Residential Buildings

ASTM INTERNATIONAL (ASTM)

ASTM A580/A580M (2015) Standard Specification for Stainless Steel Wire  
ASTM B209 (2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate  
ASTM C1136 (2012) Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation  
ASTM C1710 (2011) Standard Guide for Installation of Flexible Closed Cell Preformed Insulation in Tube and Sheet Form  
ASTM C195 (2007; R 2013) Standard Specification for Mineral Fiber Thermal Insulating Cement  
ASTM C450 (2008) Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging  
ASTM C534/C534M (2014) Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form  
ASTM C547 (2015) Standard Specification for Mineral Fiber Pipe Insulation  
ASTM C647 (2008; R 2013) Properties and Tests of Mastics and Coating Finishes for Thermal Insulation  
ASTM C795 (2008; R 2013) Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel  
ASTM C916 (2014) Standard Specification for Adhesives for Duct Thermal Insulation

ASTM C920	(2014a) Standard Specification for Elastomeric Joint Sealants
ASTM C921	(2010) Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
ASTM D2863	(2013) Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
ASTM D5590	(2000; R 2010; E 2012) Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay
ASTM E2231	(2015) Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics
ASTM E84	(2015b) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2016) Standard Test Methods for Water Vapor Transmission of Materials
FM GLOBAL (FM) FM APP GUIDE	(updated on-line) Approval Guide <a href="http://www.approvalguide.com/">http://www.approvalguide.com/</a>
MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)	
MSS SP-69	(2003; Notice 2012) Pipe Hangers and Supports - Selection and Application (ANSI Approved American National Standard)
MIDWEST INSULATION CONTRACTORS ASSOCIATION (MICA)	
MICA Insulation Stds	(1999) National Commercial & Industrial Insulation Standards
U.S. DEPARTMENT OF DEFENSE (DOD)	
MIL-A-24179	(1969; Rev A; Am 2 1980; Notice 1 1987) Adhesive, Flexible Unicellular-Plastic Thermal Insulation
MIL-A-3316	(1987; Rev C; Am 2 1990) Adhesives, Fire-Resistant, Thermal Insulation
MIL-PRF-19565	(1988; Rev C) Coating Compounds, Thermal Insulation, Fire- and Water-Resistant, Vapor-Barrier
UNDERWRITERS LABORATORIES (UL)	
UL 723	(2008; Reprint Aug 2013) Test for Surface Burning Characteristics of Building Materials
UL 94	(2013; Reprint Jan 2016) Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

## 1.2 SUMMARY OF WORK

A. The work covered under this Section of the Specifications includes the following:

1. Provide field-applied insulation and accessories on mechanical systems as specified herein; factory-applied insulation is specified under the piping, duct or equipment to be insulated.

2. Provide field-applied insulation to ductwork systems as outlined in this specification and the “Ductwork Insulation Schedule” located on contract drawings.
3. Provide field-applied insulation to mechanical piping systems as outlined in this specification and the “Piping Insulation Schedule” located on contract drawings.
4. Provide field-applied insulation to plumbing piping systems as outlined in this specification.

B. Related Sections include the following:

1. Division 0 – Bidding and Contract Requirements
2. Division 1 – General Requirements
3. Section 15200 - Plumbing, General Purpose

C. Work included:

1. The Contractor shall be responsible for the following:
  - i. Insulation of Division 15 plumbing systems.

D. Work not included:

1. Insulation being provided as an integral item to equipment being provided.
2. Process piping systems.

### 1.3 SUBMITTALS

A. Submit the following in accordance with the Conditions of the Contract and Division 1 Specification Sections and as specified herein:

1. Shop Drawings
  - i. Pipe and duct Insulation Systems and Associated Accessories
2. Product Data
  - i. Pipe and duct Insulation Systems

### 1.4 QUALITY ASSURANCE

#### 1.4.1 Installer Qualification

- A. Qualified installers shall have successfully completed three or more similar type jobs within the last 5 years.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered in the manufacturer's unopened containers. Materials delivered and placed in storage shall be provided with protection from weather, humidity, dirt, dust and other contaminants. The Owner's Representative may reject insulation material and supplies that become dirty, dusty, wet, or contaminated by some other means. Packages or standard

containers of insulation, jacket material, cements, adhesives, and coatings delivered for use, and samples required for approval shall have manufacturer's stamp or label attached giving the name of the manufacturer and brand, and a description of the material, date codes, and approximate shelf life (if applicable). Insulation packages and containers shall be asbestos free.

## 1.6 COORDINATION

- A. The contractor shall coordinate the following:
1. Division 15 mechanical ductwork systems. Insulate systems only after mechanical ductwork systems have been completely install and tested.
  2. Insulation of Division 15 mechanical piping systems. Insulate systems only after mechanical piping systems have been completely install and tested.
  3. Insulation of Division 15 mechanical industrial ductwork systems. Insulate systems only after mechanical industrial ductwork systems have been completely install and tested.
  4. Coordinate with Division 15 Testing, Adjusting, and Balancing work. Do not insulate balancing devices until TAB work has been completed and TAB reports have been reviewed and accepted.

## 2 PART PRODUCTS

### 2.1 STANDARD PRODUCTS

- A. Provide materials which are the standard products of manufacturers regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Submit a complete list of materials, including manufacturer's descriptive technical literature, performance data, catalog cuts, and installation instructions. The product number, k-value, thickness and furnished accessories including adhesives, sealants and jackets for each mechanical system requiring insulation shall be included. The product data must be copyrighted, have an identifying or publication number, and shall have been published prior to the issuance date of this solicitation. Materials furnished under this section shall be submitted together in a booklet.

#### 2.1.1 Insulation System

- A. Provide insulation systems in accordance with the approved MICA National Insulation Standards plates as supplemented by this specification. Provide field-applied insulation for heating, ventilating, and cooling (HVAC) air distribution systems and piping systems that are located within, on, under, and adjacent to buildings; and for plumbing systems. Provide CFC and HCFC free insulation.

#### 2.1.2 Surface Burning Characteristics

- A. Unless otherwise specified, insulation must have a maximum flame spread
- B. index of 25 and a maximum smoke developed index of 50 when tested in
- C. accordance with ASTM E84. Flame spread, and smoke developed indexes,
- D. shall be determined by ASTM E84 or UL 723. Test insulation in

- E. the same density and installed thickness as the material to be used in the
- F. actual construction. Prepare and mount test specimens according to ASTM E2231.

## 2.2 MATERIALS

- A. Provide insulation that meets or exceed the requirements of ASHRAE 90.1 - IP. Insulation exterior shall be cleanable, grease resistant, non-flaking and non-peeling. Materials shall be compatible and shall not contribute to corrosion, soften, or otherwise attack surfaces to which applied in either wet or dry state. Materials to be used on stainless steel surfaces shall meet ASTM C795 requirements. Calcium silicate shall not be used on chilled or cold water systems. Materials shall be asbestos free. Provide product recognized under UL 94 (if containing plastic) and listed in FM APP GUIDE.

### 2.2.1 Adhesives

#### 2.2.1.1 Acoustical Lining Insulation Adhesive

- A. Adhesive shall be a nonflammable, fire-resistant adhesive conforming to ASTM C916, Type I.

#### 2.2.1.2 Mineral Fiber Insulation Cement

- A. Cement shall be in accordance with ASTM C195.

#### 2.2.1.3 Lagging Adhesive

- A. Lagging is the material used for thermal insulation, especially around a cylindrical object. This may include the insulation as well as the cloth/material covering the insulation. To resist mold/mildew, lagging adhesive shall meet ASTM D5590 with 0 growth rating. Lagging adhesives shall be nonflammable and fire-resistant and shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Adhesive shall be MIL-A-3316, Class 1, pigmented red and be suitable for bonding fibrous glass cloth to faced and unfaced fibrous glass insulation board; for bonding cotton brattice cloth to faced and unfaced fibrous glass insulation board; for sealing edges of and bonding glass tape to joints of fibrous glass board; for bonding lagging cloth to thermal insulation; or Class 2 for attaching fibrous glass insulation to metal surfaces. Lagging adhesives shall be applied in strict accordance with the manufacturer's recommendations for pipe and duct insulation.

#### 2.2.1.4 Contact Adhesive

- A. Adhesives may be any of, but not limited to, the neoprene based, rubber based, or elastomeric type that have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. The adhesive shall not adversely affect, initially or in service, the insulation to which it is applied, nor shall it cause any corrosive effect on metal to which it is applied. Any solvent dispersing medium or volatile component of the adhesive shall have no objectionable odor and shall not contain any benzene or carbon tetrachloride. The dried adhesive shall not emit nauseous, irritating, or toxic volatile matters or aerosols when the adhesive is heated to any temperature up to 212 degrees F. The dried

adhesive shall be nonflammable and fire resistant. Flexible Elastomeric Adhesive: Comply with MIL-A-24179, Type II, Class I. Provide product listed in FM APP GUIDE.

### 2.2.2 Caulking

- A. ASTM C920, Type S, Grade NS, Class 25, Use A.

### 2.2.3 Corner Angles

- A. Nominal 0.016 inch aluminum 1 by 1 inch with factory applied kraft backing. Aluminum shall be ASTM B209, Alloy 3003, 3105, or 5005.

### 2.2.4 Fittings

- A. Fabricated Fittings are the prefabricated fittings for flexible elastomeric pipe insulation systems in accordance with ASTM C1710. Together with the flexible elastomeric tubes, they provide complete system integrity for retarding heat gain and controlling condensation drip from chilled-water and refrigeration systems. Flexible elastomeric, fabricated fittings provide thermal protection (0.25 k) and condensation resistance (0.05 Water Vapor Transmission factor). For satisfactory performance, properly installed protective vapor retarder/barriers and vapor stops shall be used on high relative humidity and below ambient temperature applications to reduce movement of moisture through or around the insulation to the colder interior surface.

### 2.2.5 Finishing Cement

- A. ASTM C450: Mineral fiber hydraulic-setting thermal insulating and finishing cement. All cements that may come in contact with Austenitic stainless steel must comply with ASTM C795.

### 2.2.6 Fibrous Glass Cloth and Glass Tape

- A. Fibrous glass cloth, with 20X20 maximum mesh size, and glass tape shall have maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Tape shall be 4 inch wide rolls. Class 3 tape shall be 4.5 ounces/square yard. Elastomeric Foam Tape: Black vapor-retarder foam tape with acrylic adhesive containing an anti-microbial additive.

### 2.2.7 Staples

- A. Outward clinching type monel.

### 2.2.8 Jackets

#### 2.2.8.1 Polyvinyl Chloride (PVC) Jackets

- A. Polyvinyl chloride (PVC) jacket and fitting covers shall have high impact strength, ultraviolet (UV) resistant rating or treatment and moderate chemical resistance with minimum thickness 0.030 inch.

### 2.2.8.2 Vapor Barrier/Vapor Retarder

- A. Apply the following criteria to determine which system is required.
  - 1. On ducts, piping and equipment operating below 55 degrees F or located outside shall be equipped with a vapor barrier.
  - 2. Ducts, pipes and equipment that are located inside and that always operate above 55 degrees F shall be installed with a vapor retarder where required as stated in paragraph VAPOR RETARDER REQUIRED.

### 2.2.9 Vapor Retarder Required

- A. ASTM C921, Type I, minimum puncture resistance 50 Beach units on all surfaces except concealed ductwork, where a minimum puncture resistance of 25 Beach units is acceptable. Minimum tensile strength, 35 pounds/inch width. ASTM C921, Type II, minimum puncture resistance 25 Beach units, tensile strength minimum 20 pounds/inch width. Jackets used on insulation exposed in finished areas shall have white finish suitable for painting without sizing. Based on the application, insulation materials that require manufacturer or fabricator applied pipe insulation jackets are cellular glass, when all joints are sealed with a vapor barrier mastic, and mineral fiber. All non-metallic jackets shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Flexible elastomerics require (in addition to vapor barrier skin) vapor retarder jacketing for high relative humidity and below ambient temperature applications.

#### 2.2.9.1 White Vapor Retarder All Service Jacket (ASJ)

- A. ASJ is for use on hot/cold pipes, ducts, or equipment indoors or outdoors if covered by a suitable protective jacket. The product shall meet all physical property and performance requirements of ASTM C1136, Type I, except the burst strength shall be a minimum of 85 psi. ASTM D2863 Limited Oxygen Index (LOI) shall be a minimum of 31.
- A. In addition, neither the outer exposed surface nor the inner-most surface contacting the insulation shall be paper or other moisture-sensitive material. The outer exposed surface shall be white and have an emittance of not less than 0.80. The outer exposed surface shall be paintable.

#### 2.2.9.2 Vapor Retarder/Vapor Barrier Mastic Coatings

##### 2.2.9.2.1 Vapor Barrier

- A. The vapor barrier shall be self-adhesive (minimum 2 mils adhesive, 3 mils embossed) greater than 3 plies standard grade, silver, white, black and embossed white jacket for use on hot/cold pipes. Permeability shall be less than 0.02 when tested in accordance with ASTM E96/E96M. Products shall meet UL 723 or ASTM E84 flame and smoke requirements and shall be UV resistant.

##### 2.2.9.2.2 Vapor Retarder

- A. The vapor retarder coating shall be fire and water resistant and appropriately selected for either outdoor or indoor service. Color shall be white. The water vapor permeance of the compound shall be 0.013 perms or less at 43 mils dry film thickness as determined according

to procedure B of ASTM E96/E96M utilizing apparatus described in ASTM E96/E96M. The coating shall be nonflammable, fire resistant type. To resist mold/mildew, coating shall meet ASTM D5590 with 0 growth rating. Coating shall meet MIL-PRF-19565 Type II (if selected for indoor service) and be Qualified Products Database listed. All other application and service properties shall be in accordance with ASTM C647.

#### 2.2.9.2.3 Laminated Film Vapor Retarder

- A. ASTM C1136, Type I, maximum moisture vapor transmission 0.02 perms, minimum puncture resistance 50 Beach units on all surfaces except concealed ductwork; where Type II, maximum moisture vapor transmission 0.02 perms, a minimum puncture resistance of 25 Beach units is acceptable. Vapor retarder shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Flexible Elastomeric exterior foam with factory applied UV Jacket. Construction of laminate designed to provide UV resistance, high puncture, tear resistance and an excellent WVT rate.

#### 2.2.10 Vapor Retarder Not Required

- A. ASTM C921, Type II, Class D, minimum puncture resistance 50 Beach units on all surfaces except ductwork, where Type IV, maximum moisture vapor transmission 0.10, a minimum puncture resistance of 25 Beach units is acceptable. Jacket shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84.

#### 2.2.11 Wire

- A. Soft annealed ASTM A580/A580M Type 302, 304 or 316 stainless steel, 16 or 18 gauge.

#### 2.2.12 Insulation Bands

- A. Insulation bands shall be 1/2 inch wide; 26 gauge stainless steel.

#### 2.2.13 Sealants

- A. Sealants shall be chosen from the butyl polymer type, the styrene-butadiene rubber type, or the butyl type of sealants. Sealants shall have a maximum permeance of 0.02 perms based on Procedure B for ASTM E96/E96M, and a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84.

### 2.3 PIPE INSULATION SYSTEMS

- A. Conform insulation materials to Table 1 and minimum insulation thickness as listed in Table 2 and meet or exceed the requirements of ASHRAE 90.1 - IP. Limit pipe insulation materials to those listed herein and meeting the following requirements:

#### 2.3.1 Aboveground Cold Pipeline ( -30 to 60 deg. F)

- A. Insulation for outdoor, indoor, exposed or concealed applications, shall be as follows:

##### 2.3.1.1 Flexible Elastomeric Cellular Insulation



- A. Closed-cell, foam- or expanded-rubber materials containing anti-microbial additive, complying with ASTM C534/C534M, Grade 1, Type I or II. Type I, Grade 1 for tubular materials. Type II, Grade 1, for sheet materials. Type I and II shall have vapor retarder/vapor barrier skin on one or both sides of the insulation, and require an additional exterior vapor retarder covering for high relative humidity and below ambient temperature applications.

#### 2.3.1.2 Mineral Fiber Insulation with Integral Wicking Material (MFIWM)

- A. ASTM C547. Install in accordance with manufacturer's instructions. Do not use in applications exposed to outdoor ambient conditions in climatic zones 1 through 4.

#### 2.3.2 Aboveground Hot Pipeline (Above 60 deg. F)

- A. Insulation for outdoor, indoor, exposed or concealed applications shall meet the following requirements. Supply the insulation with manufacturer's recommended factory-applied jacket/vapor barrier.

#### 2.3.3 Mineral Fiber

- A. ASTM C547, Types I, II or III, supply the insulation with manufacturer's recommended factory-applied jacket.

### 3 PART EXECUTION

#### 3.1 APPLICATION - GENERAL

- A. Insulation shall only be applied to unheated and uncooled piping and equipment. Flexible elastomeric cellular insulation shall not be compressed at joists, studs, columns, ducts, hangers, etc. The insulation shall not pull apart after a one-hour period; any insulation found to pull apart after one hour, shall be replaced.

##### 3.1.1 Installation

- A. Except as otherwise specified, material shall be installed in accordance with the manufacturer's written instructions. Insulation materials shall not be applied until tests specified in other sections of this specification are completed. Material such as rust, scale, dirt and moisture shall be removed from surfaces to receive insulation. Insulation shall be kept clean and dry. Insulation shall not be removed from its shipping containers until the day it is ready to use and shall be returned to like containers or equally protected from dirt and moisture at the end of each workday. Insulation that becomes dirty shall be thoroughly cleaned prior to use. If insulation becomes wet or if cleaning does not restore the surfaces to like new condition, the insulation will be rejected, and shall be immediately removed from the jobsite. Joints shall be staggered on multi-layer insulation. Mineral fiber thermal insulating cement shall be mixed with demineralized water when used on stainless steel surfaces. Insulation, jacketing and accessories shall be installed in accordance with MICA Insulation Stds plates except where modified herein or on the drawings.

##### 3.1.2 Pipes/Ducts/ That Require Insulation

- A. Insulation is required on all pipes, ducts, or except for omitted items as specified.

## 3.2 PIPE INSULATION SYSTEMS INSTALLATION

### 3.2.1 Pipe Insulation

#### 3.2.1.1 General

- A. Pipe insulation shall be installed on aboveground hot and cold pipeline systems as specified below to form a continuous thermal retarder/barrier, including straight runs, fittings and appurtenances unless specified otherwise. Installation shall be with full length units of insulation and using a single cut piece to complete a run. Cut pieces or scraps abutting each other shall not be used. Pipe insulation shall be omitted on the following:
  - 1. Pipe used solely for fire protection.
  - 2. Chromium plated pipe to plumbing fixtures. However, fixtures for use by the physically handicapped shall have the hot water supply and drain, including the trap, insulated where exposed.
  - 3. Sanitary drain lines.
  - 4. Air chambers.
  - 5. Adjacent insulation.
  - 6. ASME stamps.
  - 7. Access plates of fan housings.
  - 8. Cleanouts or handholes.

#### 3.2.1.2 Pipes Passing Through Walls, Roofs, and Floors

- A. Pipe insulation shall be continuous through the sleeve.
- B. Provide an aluminum jacket or vapor barrier/weatherproofing self-adhesive jacket (minimum 2 mils adhesive, 3 mils embossed) less than 0.0000 permeability, greater than 3 ply standard grade, silver, white, black and embossed with factory applied moisture retarder over the insulation wherever penetrations require sealing.

##### 3.2.1.2.1 Penetrate Interior Walls

- A. The aluminum jacket or vapor barrier/weatherproofing - self-adhesive jacket (minimum 2 mils adhesive, 3 mils embossed) less than 0.0000 permeability, greater than 3 plies standard grade, silver, white, black and embossed shall extend 2 inches beyond either side of the wall and shall be secured on each end with a band.

#### 3.2.1.3 Pipes Passing Through Hangers

- A. Insulation, whether hot or cold application, shall be continuous through hangers. All horizontal pipes 2 inches and smaller shall be supported on hangers with the addition of a Type 40 protection shield to protect the insulation in accordance with MSS SP-69. Whenever insulation shows signs of being compressed, or when the insulation or jacket shows visible signs of distortion at or near the support shield, insulation inserts as specified below for piping larger than 2 inches shall be installed, or factory insulated hangers (designed with a load bearing core) can be used.

#### 3.2.1.3.1 Horizontal Pipes Larger Than 2 Inches at 60 Degrees F and Above

- A. Supported on hangers in accordance with MSS SP-69, and Section PLUMBING, GENERAL PURPOSE.

#### 3.2.1.3.2 Vertical Pipes

- A. Supported with either Type 8 or Type 42 riser clamps with the addition of two Type 40 protection shields in accordance with MSS SP-69 covering the 360-degree arc of the insulation. An insulation insert of cellular glass or calcium silicate shall be installed between each shield and the pipe. The insert shall cover the 360-degree arc of the pipe. Inserts shall be the same thickness as the insulation, and shall extend 2 inches on each end beyond the protection shield. When insulation inserts are required in accordance with the above, and the insulation thickness is less than 1 inch, wooden or cork dowels or blocks may be installed between the pipe and the shield to prevent the hanger from crushing the insulation, as an option instead of installing insulation inserts. The insulation jacket shall be continuous over the wooden dowel, wooden block, or insulation insert. The vertical weight of the pipe shall be supported with hangers located in a horizontal section of the pipe. When the pipe riser is longer than 30 feet, the weight of the pipe shall be additionally supported with hangers in the vertical run of the pipe that are directly clamped to the pipe, penetrating the pipe insulation. These hangers shall be insulated and the insulation jacket sealed as indicated herein for anchors in a similar service.

#### 3.2.1.3.3 Inserts

- A. Covered with a jacket material of the same appearance and quality as the adjoining pipe insulation jacket, overlap the adjoining pipe jacket 1-1/2 inches, and seal as required for the pipe jacket. The jacket material used to cover inserts in flexible elastomeric cellular insulation shall conform to ASTM C1136, Type 1, and is allowed to be of a different material than the adjoining insulation material.

#### 3.2.1.4 Pipes in high abuse areas.

- A. In high abuse areas such as janitor closets and traffic areas in equipment rooms, kitchens, and mechanical rooms, welded PVC, aluminum or flexible laminate cladding (comprised of elastomeric, plastic or metal foil laminate) laminated self-adhesive (minimum 2 mils adhesive, 3 mils embossed) vapor barrier/weatherproofing jacket, - less than 0.0000 permeability; (greater than 3 ply, standard grade, silver, white, black and embossed) jackets shall be utilized. Pipe insulation to the 6 foot level shall be protected.

#### 3.2.1.5 Pipe Insulation Material and Thickness

- A. Pipe insulation materials must be as listed in Table 1 and must meet or exceed the requirements of ASHRAE 90.1 - IP.

TABLE 1

Insulation Material for Piping

Service

Material	Specification	Type	Class	VR/VB Req'd
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Cold Domestic Water Piping, Makeup Water & Drinking Fountain Drain Piping

Mineral Fiber	ASTM C547	I		Yes
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Hot Domestic Water Supply & Recirculating Piping (Max 200 F)

Mineral Fiber	ASTM C547	I	1	No
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Refrigerant Suction Piping (35 degrees F nominal)

Flexible Elastomeric Cellular	ASTM C534/C534M	I		No
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Roof Drain Leaders (Including Underside of Roof Drain Fittings)

Mineral Fiber	ASTM C547	I		Yes
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Condensate Drain Located Inside Building

Flexible Elastomeric Cellular	ASTM C534/C534M	I		No
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Note: VR/VB = Vapor Retarder/Vapor Barrier

TABLE 2					
Piping Insulation Thickness (inch)					
Do not use integral wicking material in Chilled water applications exposed to outdoor ambient conditions in climatic zones 1 through 4.					
Service					
Material	Tube And Pipe Size (inch)				
	<1	1-<1.5	1.5-<4	4-<8	> or = >8
Cold Domestic Water Piping, Makeup Water & Drinking Fountain Drain Piping					
Mineral Fiber	1	1	1	1	1
Hot Domestic Water Supply & Recirculating Piping (Max 200 F)					
Mineral Fiber	1	1	1	1.5	1.5
Refrigerant Suction Piping (35 degrees F nominal)					
Flexible Elastomeric Cellular	1	1	1	N/A	N/A
Roof Drain Leaders (Including Underside of Roof Drain Fittings)					
Mineral Fiber	1	1	1	1	1
Condensate Drain Located Inside Building					
Flexible Elastomeric Cellular	1	1	1	N/A	N/A

### 3.2.2 Aboveground Cold Pipelines

A. The following cold pipelines for minus 30 to plus 60 degrees F, shall be insulated in accordance with Table 2 except those piping listed in subparagraph Pipe Insulation in PART 3 as to be omitted. This includes but is not limited to the following:

1. Domestic cold and chilled drinking water.

#### 3.2.2.1 Insulation Material and Thickness

- A. Insulation thickness for cold pipelines shall be determined using Table 2.

#### 3.2.2.2 Factory or Field applied Jacket

- A. Insulation shall be covered with a factory applied vapor retarder jacket/vapor barrier or field applied seal welded PVC jacket or greater than 3 ply laminated self-adhesive (minimum 2 mils adhesive, 3 mils embossed) vapor barrier/weatherproofing jacket - less than 0.0000 permeability, standard grade, silver, white, black and embossed for use with Mineral Fiber, Cellular Glass, and Phenolic Foam Insulated Pipe. Insulation inside the building, to be protected with an aluminum jacket or greater than 3ply vapor barrier/weatherproofing self-adhesive (minimum 2 mils adhesive, 3 mils embossed) product, less than 0.0000 permeability, standard grade, Embossed Silver, White & Black, shall have the insulation and vapor retarder jacket installed as specified herein. The aluminum jacket or greater than 3ply vapor barrier/weatherproofing self-adhesive (minimum 2 mils adhesive, 3 mils embossed) product, less than 0.0000 permeability, standard grade, embossed silver, White & Black, shall be installed as specified for piping exposed to weather, except sealing of the laps of the aluminum jacket is not required. In high abuse areas such as janitor closets and traffic areas in equipment rooms, kitchens, and mechanical rooms, aluminum jackets or greater than 3ply vapor barrier/weatherproofing self-adhesive (minimum 2 mils adhesive, 3 mils embossed) product, less than 0.0000 permeability, standard grade, embossed silver, white & black, shall be provided for pipe insulation to the 6 ft level.

#### 3.2.2.3 Installing Insulation for Straight Runs Hot and Cold Pipe

- A. Apply insulation to the pipe with tight butt joints. Seal all butted joints and ends with joint sealant and seal with a vapor retarder coating, greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape or PVDC adhesive tape.

##### 3.2.2.3.1 Longitudinal Laps of the Jacket Material

- A. Overlap not less than 1-1/2 inches. Provide butt strips 3 inches wide for circumferential joints.

##### 3.2.2.3.2 Laps and Butt Strips

- A. Secure with adhesive and staple on 4 inch centers if not factory self-sealing. If staples are used, seal in accordance with paragraph STAPLES below. Note that staples are not required with cellular glass systems.

##### 3.2.2.3.3 Factory Self-Sealing Lap Systems

- A. May be used when the ambient temperature is between 40 and 120 degrees F during installation. Install the lap system in accordance with manufacturer's recommendations. Use a stapler only if specifically recommended by the manufacturer. Where gaps occur, replace the section or repair the gap by applying adhesive under the lap and then stapling.

##### 3.2.2.3.4 Staples

- A. Coat all staples, including those used to repair factory self-seal lap systems, with a vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than

0.0000 perm adhesive tape. Coat all seams, except those on factory self-seal systems, with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

#### 3.2.2.3.5 Breaks and Punctures in the Jacket Material

- A. Patch by wrapping a strip of jacket material around the pipe and secure it with adhesive, staple, and coat with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape. Extend the patch not less than 1-1/2 inches past the break.

#### 3.2.2.3.6 Penetrations Such as Thermometers

- A. Fill the voids in the insulation and seal with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

#### 3.2.2.3.7 Flexible Elastomeric Cellular Pipe Insulation

- A. Install by slitting the tubular sections and applying them onto the piping or tubing. Alternately, whenever possible slide un-slit sections over the open ends of piping or tubing. Secure all seams and butt joints and seal with adhesive. When using self seal products only the butt joints shall be secured with adhesive. Push insulation on the pipe, never pulled. Stretching of insulation may result in open seams and joints. Clean cut all edges. Rough or jagged edges of the insulation are not be permitted. Use proper tools such as sharp knives. Do not stretch Grade 1, Type II sheet insulation around the pipe when used on pipe larger than 6 inches. On pipes larger than 12 inches, adhere sheet insulation directly to the pipe on the lower 1/3 of the pipe.

#### 3.2.2.4 Insulation for Fittings and Accessories

- A. Pipe insulation shall be tightly butted to the insulation of the fittings and accessories. The butted joints and ends shall be sealed with joint sealant and sealed with a vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.
- B. Precut or preformed insulation shall be placed around all fittings and accessories and shall conform to MICA plates except as modified herein: 5 for anchors; 10, 11, and 13 for fittings; 14 for valves; and 17 for flanges and unions. Insulation shall be the same insulation as the pipe insulation, including same density, thickness, and thermal conductivity. Where precut/preformed is unavailable, rigid preformed pipe insulation sections may be segmented into the shape required. Insulation of the same thickness and conductivity as the adjoining pipe insulation shall be used. If nesting size insulation is used, the insulation shall be overlapped 2 inches or one pipe diameter. Elbows insulated using segments shall conform to MICA Tables 12.20 "Mitered Insulation Elbow". Submit a booklet containing completed MICA Insulation Stds plates detailing each insulating system for each pipe, duct, insulating system, after approval of materials and prior to applying insulation.
  - (1) The MICA plates shall detail the materials to be installed and the specific insulation application. Submit all MICA plates required showing the entire insulating system, including plates required to show insulation penetrations, vessel bottom and top heads,

legs, and skirt insulation as applicable. The MICA plates shall present all variations of insulation systems including locations, materials, vaporproofing, jackets and insulation accessories.

- (2) If the Contractor elects to submit detailed drawings instead of edited MICA Plates, the detail drawings shall be technically equivalent to the edited MICA Plate submittal.
- C. Upon completion of insulation installation on flanges, unions, valves, anchors, fittings and accessories, terminations, seams, joints and insulation not protected by factory vapor retarder jackets or PVC fitting covers shall be protected with PVDC or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape or two coats of vapor retarder coating with a minimum total thickness of 1/16 inch, applied with glass tape embedded between coats. Tape seams shall overlap 1 inch. The coating shall extend out onto the adjoining pipe insulation 2 inches. Fabricated insulation with a factory vapor retarder jacket shall be protected with either greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape, standard grade, silver, white, black and embossed or PVDC adhesive tape or two coats of vapor retarder coating with a minimum thickness of 1/16 inch and with a 2 inch wide glass tape embedded between coats. Where fitting insulation butts to pipe insulation, the joints shall be sealed with a vapor retarder coating and a 4 inch wide ASJ tape which matches the jacket of the pipe insulation.
- D. Anchors attached directly to the pipe shall be insulated for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface.
- E. Insulation shall be marked showing the location of unions, strainers, and check valves.

### 3.2.3 Aboveground Hot Pipelines

#### 3.2.3.1 General Requirements

- A. All hot pipe lines above 60 degrees F, except those piping listed in subparagraph Pipe Insulation in PART 3 as to be omitted, shall be insulated in accordance with Table 2. This includes but is not limited to the following:
  1. Domestic Hot water
  2. Recirculated hot water.

#### 3.2.3.2 Insulation for Fittings and Accessories

- A. Pipe insulation shall be tightly butted to the insulation of the fittings and accessories. The butted joints and ends shall be sealed with joint sealant. Insulation shall be marked showing the location of unions, strainers, check valves and other components that would otherwise be hidden from view by the insulation.

##### 3.2.3.2.1 Precut or Preformed

- A. Place precut or preformed insulation around all fittings and accessories. Insulation shall be the same insulation as the pipe insulation, including same density, thickness, and thermal conductivity.

##### 3.2.3.2.2 Rigid Preformed



- A. Where precut/preformed is unavailable, rigid preformed pipe insulation sections may be segmented into the shape required. Insulation of the same thickness and conductivity as the adjoining pipe insulation shall be used. If nesting size insulation is used, the insulation shall be overlapped 2 inches or one pipe diameter. Elbows insulated using segments shall conform to MICA Tables 12.20 "Mitered Insulation Elbow".

### 3.3 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 – Contract Closeout

END OF SECTION 15070

## SECTION 15300

### BASIC MECHANICAL MATERIALS AND METHODS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

##### 1.1.1 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

###### ASTM INTERNATIONAL (ASTM)

ASTM B117 (2016) Standard Practice for Operating Salt Spray (Fog) Apparatus

###### INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

###### NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG 1 (2016; SUPP 2016) Motors and Generators

NEMA MG 10 (2017) Energy Management Guide for Selection and Use of Fixed Frequency Medium AC Squirrel-Cage Polyphase Induction Motors

NEMA MG 11 (1977; R 2012) Energy Management Guide for Selection and Use of Single Phase Motors

###### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code

##### 1.2 SUMMARY OF WORK

- A. The work covered under this Section of the Specifications includes general requirements that apply to all Division 15 specifications.:
- B. Related Sections include the following:

1. Division 0 – Bidding and Contract Requirements
2. Division 1 – General Requirements

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Material and Equipment Qualifications

- A. Provide materials and equipment that are standard products of manufacturers regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. Standard products must have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use must include applications of equipment and materials under similar circumstances and of similar size. The product must have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2 year period.

#### 1.3.2 Alternative Qualifications

Products having less than a two-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests, can be shown.

#### 1.3.3 Service Support

The equipment items must be supported by service organizations. Submit a certified list of qualified permanent service organizations for support of the equipment which includes their addresses and qualifications. These service organizations must be reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

#### 1.3.4 Manufacturer's Nameplate

For each item of equipment, provide a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

#### 1.3.5 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction", or words of similar meaning, to mean the Contracting Officer.

##### 1.3.5.1 Definitions

For the International Code Council (ICC) Codes referenced in the contract documents, advisory provisions must be considered mandatory, the word "should" is interpreted as "must." Reference

to the "code official" must be interpreted to mean the "Contracting Officer." For Navy owned property, references to the "owner" must be interpreted to mean the "Contracting Officer." For leased facilities, references to the "owner" must be interpreted to mean the "lessor." References to the "permit holder" must be interpreted to mean the "Contractor."

#### 1.3.5.2 Administrative Interpretations

For ICC Codes referenced in the contract documents, the provisions of Chapter 1, "Administrator," do not apply. These administrative requirements are covered by the applicable Federal Acquisition Regulations (FAR) included in this contract and by the authority granted to the Officer in Charge of Construction to administer the construction of this project. References in the ICC Codes to sections of Chapter 1, must be applied appropriately by the Contracting Officer as authorized by his administrative cognizance and the FAR.

#### DELIVERY, STORAGE, AND HANDLING

Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

#### 1.4 COORDINATION

- A. See individual specification sections for coordination requirements.

#### 1.5 ELECTRICAL REQUIREMENTS

- A. Furnish motors, controllers, disconnects and contactors with their respective pieces of equipment. Motors, controllers, disconnects and contactors must conform to and have electrical connections provided under Section ELECTRIC ITEM SUB BID DIVISION 16. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120 volt control circuits, and must have auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work must be included under the section that specified that motor or equipment. Power wiring and conduit for field installed equipment must be provided under and conform to the requirements of Section INTERIOR DISTRIBUTION SYSTEM.

#### 1.6 ELECTRICAL INSTALLATION REQUIREMENTS

- A. Electrical installations must conform to IEEE C2, NFPA 70, and requirements specified herein.

##### 1.6.1 New Work

- A. Provide electrical components of mechanical equipment, such as motors, motor starters (except starters/controllers which are indicated as part of a motor control center), control or

push-button stations, float or pressure switches, solenoid valves, integral disconnects, and other devices functioning to control mechanical equipment, as well as control wiring and conduit for circuits rated 100 volts or less, to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors are not to be permitted. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, the motor control equipment forming a part of motor control centers, and the electrical power circuits must be provided under Division 26, except internal wiring for components of package equipment must be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide any required changes to the electrical service as may be necessary and related work as a part of the work for the section specifying that motor or equipment.

## 1.6.2 Modifications to Existing Systems

- A. Where existing mechanical systems and motor-operated equipment require modifications, provide electrical components under Division 16.

## 1.7 Motors

### 1.7.1 High Efficiency Motors

#### 1.7.1.1 High Efficiency Single-Phase Motors

- A. Unless otherwise specified, single-phase fractional-horsepower alternating-current motors must be high efficiency types corresponding to the applications listed in NEMA MG 11.

#### 1.7.1.2 High Efficiency Polyphase Motors

- A. Unless otherwise specified, polyphase motors must be selected based on high efficiency characteristics relative to the applications as listed in NEMA MG 10. Additionally, polyphase squirrel-cage medium induction motors with continuous ratings must meet or exceed energy efficient ratings in accordance with Table 12-6C of NEMA MG 1.

### 1.7.2 Three-Phase Motor Protection

Provide controllers for motors rated one 1 horsepower and larger with electronic phase-voltage monitors designed to protect motors from phase-loss, undervoltage, and overvoltage. Provide protection for motors from immediate restart by a time adjustable restart relay.

## 1.8 INSTRUCTION TO GOVERNMENT PERSONNEL

When specified in other sections, furnish the services of competent instructors to give full instruction to the designated Government personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the specified equipment or system. Instructors must be thoroughly familiar with all parts of the installation and must be trained in operating theory as well as practical operation and maintenance work.

Instruction must be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished must be as specified in the individual section. When more than 4 man-days of instruction are specified, use approximately half of the time for classroom instruction. Use other time for instruction with the equipment or system.

When significant changes or modifications in the equipment or system are made under the terms of the contract, provide additional instruction to acquaint the operating personnel with the changes or modifications.

## 1.9 ACCESSIBILITY

Install all work so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install concealed valves, expansion joints, controls, dampers, and equipment requiring access, in locations freely accessible through access doors.

## 2 PART PRODUCTS

A. Not Used

## 3 PART EXECUTION

### 3.1 PAINTING OF NEW EQUIPMENT

A. New equipment painting must be factory applied or shop applied, and must be as specified herein, and provided under each individual section.

#### 3.1.1 Factory Painting Systems

- A. Manufacturer's standard factory painting systems may be provided subject to certification that the factory painting system applied will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors must withstand 500 hours in a salt-spray fog test. Salt-spray fog test must be in accordance with ASTM B117, and for that test the acceptance criteria must be as follows: immediately after completion of the test, the paint must show no signs of blistering, wrinkling, or cracking, and no loss of adhesion; and the specimen must show no signs of rust creepage beyond 0.125 inch on either side of the scratch mark.
- B. The film thickness of the factory painting system applied on the equipment must not be less than the film thickness used on the test specimen. If manufacturer's standard factory painting system is being proposed for use on surfaces subject to temperatures above 120 degrees F, the factory painting system must be designed for the temperature service.

#### 3.1.2 Shop Painting Systems for Metal Surfaces

- A. Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces need not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except

metal surfaces subject to temperatures in excess of 120 degrees F must be cleaned to bare metal.

- B. Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat. Color of finish coat must be aluminum or light gray.
- C. Temperatures Less Than 120 Degrees F: Immediately after cleaning, the metal surfaces subject to temperatures less than 120 degrees F must receive one coat of pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of primer applied to a minimum dry film thickness of 1 mil; and two coats of enamel applied to a minimum dry film thickness of 1 mil per coat.
- D. Temperatures Between 120 and 400 Degrees F: Metal surfaces subject to temperatures between 120 and 400 degrees F must receive two coats of 400 degrees F heat-resisting enamel applied to a total minimum thickness of 2 mils.
- E. Temperatures Greater Than 400 Degrees F: Metal surfaces subject to temperatures greater than 400 degrees F must receive two coats of 600 degrees F heat-resisting paint applied to a total minimum dry film thickness of 2 mils.

### 3.2 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 – Contract Closeout

END OF SECTION 15300

## SECTION 16001

### BASIC ELECTRICAL MATERIALS AND METHODS

#### PART 1 – GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

##### 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

##### ASTM INTERNATIONAL (ASTM)

ASTM D709 (2017) Standard Specification for Laminated Thermosetting Materials

ASTM B1 (2013) Standard Specification for Hard-Drawn Copper Wire

ASTM B8 (2011) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

ASTM D709 (2016) Standard Specification for Laminated Thermosetting Materials

##### INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100 (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms

IEEE C2 (2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

IEEE C57.12.28 (2014) Standard for Pad-Mounted Equipment - Enclosure Integrity

IEEE C57.12.29 (2014) Standard for Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments

##### AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C80.1 (2005) American National Standard for Electrical Rigid Steel Conduit (ERSC)

ANSI C80.3 (2015) American National Standard for Electrical Metallic Tubing (EMT)

ANSI C80.5 (2015) American National Standard for Electrical Rigid Aluminum Conduit



## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- NEMA 250 (2014) Enclosures for Electrical Equipment (1000 Volts Maximum)
- NEMA ICS 1 (2000; R 2015) Standard for Industrial Control and Systems: General Requirements
- NEMA ICS 2 (2000; R 2005; Errata 2008) Industrial Control and Systems Controllers, Contactors, and Overload Relays Rated 600 V
- NEMA ICS 4 (2015) Terminal Blocks
- NEMA ICS 6 (1993; R 2011) Industrial Control and Systems: Enclosures
- NEMA KS 1 (2013) Enclosed and Miscellaneous Distribution Equipment Switches (600 V Maximum)
- NEMA RN 1 (2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- NEMA TC 2 (2013) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
- NEMA TC 3 (2015) Standard for Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
- NEMA WD 1 (1999; R 2015) Standard for General Color Requirements for Wiring Devices
- NEMA WD 6 (2016) Wiring Devices Dimensions Specifications
- NEMA Z535.4 (2011) American National Standard for Product Safety Signs and Labels

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- NFPA 70 (2017; ERTA 1-2 2017; TIA 17-1; TIA 17-2; TIA 17-3; TIA 17-4; TIA 17-5; TIA 17-6; TIA 17-7; TIA 17-8; TIA 17-9; TIA 17-10; TIA 17-11; TIA 17-12; TIA 17-13; TIA 17-14; TIA 17-15; TIA 17-16; TIA 17-17 ) National Electrical Code

## TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

- TIA-569 (2015d) Commercial Building Standard for Telecommunications Pathways and Spaces
- TIA-607 (2011b) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

## UNDERWRITERS LABORATORIES (UL)

UL 1	(2005; Reprint Jul 2012) Standard for Flexible Metal Conduit
UL 1063	(2006; Reprint Jul 2012) Machine-Tool Wires and Cables
UL 1242	(2006; Reprint Mar 2014) Standard for Electrical Intermediate Metal Conduit -- Steel
UL 1449	(2014; Reprint Mar 2016) UL Standard for Safety Surge Protective Devices
UL 1569	(2014; Reprint Jul 2016) UL Standard for Safety Metal-Clad Cables
UL 1660	(2014) Liquid-Tight Flexible Nonmetallic Conduit
UL 1699	(2006; Reprint Nov 2013) Arc-Fault Circuit-Interrupters
UL 20	(2010; Reprint Feb 2012) General-Use Snap Switches
UL 2043	(2013) Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
UL 360	(2013; Reprint Jan 2015) Liquid-Tight Flexible Steel Conduit
UL 44	(2014; Reprint Feb 2015) Thermoset-Insulated Wires and Cables
UL 467	(2013) Grounding and Bonding Equipment
UL 486A-486B	(2013; Reprint Jan 2016) Wire Connectors
UL 486C	(2013; Reprint Jan 2016) Splicing Wire Connectors
UL 489	(2016) UL Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
UL 5	(2016) UL Standard for Safety Surface Metal Raceways and Fittings
UL 50	(2015) UL Standard for Safety Enclosures for Electrical Equipment, Non-Environmental Considerations
UL 506	(2008; Reprint Oct 2013) Specialty Transformers
UL 508	(1999; Reprint Oct 2013) Industrial Control Equipment
UL 510	(2005; Reprint Jul 2013) Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape
UL 514A	(2013) Metallic Outlet Boxes
UL 514B	(2012; Reprint Nov 2014) Conduit, Tubing and Cable Fittings

UL 514C	(2014; Reprint Dec 2014) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 5A	(2015) Nonmetallic Surface Raceways and Fittings
UL 6	(2007; Reprint Nov 2014) Electrical Rigid Metal Conduit-Steel
UL 651	(2011; Reprint Jun 2016) UL Standard for Safety Schedule 40 and 80 Rigid PVC Conduit and Fittings
UL 67	(2009; Reprint Dec 2016) UL Standard for Safety Panelboards
UL 6A	(2008; Reprint Nov 2014) Electrical Rigid Metal Conduit - Aluminum, Red Brass, and Stainless Steel
UL 719	(2006; Reprint Apr 2013) Nonmetallic-Sheathed Cables
UL 797	(2007; Reprint Dec 2012) Electrical Metallic Tubing -- Steel
UL 83	(2014) Thermoplastic-Insulated Wires and Cables
UL 869A	(2006) Reference Standard for Service Equipment
UL 870	(2016) UL Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings
UL 943	(2016) UL Standard for Safety Ground-Fault Circuit-Interrupters

#### INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2017; Errata 2017) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
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### 1.3 DEFINITIONS

- A. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.
- B. The word “Contractor” as referred to in this specification is defined as the Electrical Contractor or EC.
- C. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- D. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

#### 1.4 ELECTRICAL CHARACTERISTICS

- A. Electrical characteristics for this project shall be 480V, 3 phase 4 wire obtained from a distribution panel in the main plant electric room.

#### 1.5 SUMMARY OF WORK

- A. The work covered under this Section of the Specifications includes the following:

- 1. Under this Section, the Contractor shall provide all, labor, materials, services and equipment required to complete all items of power and auxiliary electrical systems, indicated on the Contract Drawings by symbols, schedules, diagrams, notes and described in these Specifications or reasonably implied therefrom to include the items in the following general outline of work to be performed:
  - i. Connections to control equipment and other electrical equipment or electrically operated apparatus as detailed in other Sections of these Specifications and as shown on the Contract Drawings.
  - ii. Provide new electric service connected to existing building via underground duct bank.
  - iii. Provide interior power distribution and lighting
  - iv. Provide power connection to process equipment
  - v. Provide conduit and wiring for process controls

- B. Related Sections include the following:

- 1. Division 0 – Bidding and Contract Requirements
- 2. Division 1 – General Requirements
- 3. Division 16- All sections

- C. Work included:

- 1. The Contractor shall furnish and install all electrical apparatus, equipment, and labor, unless an exception is made by the Owner.
- 2. All conduit and wiring, including fittings, boxes, covers, mounting hardware and accessories, for electrical equipment and electrically operated apparatus provided and/or installed under this Contract shall be furnished and installed by the Contractor, and they shall be responsible for all wiring connections to this equipment.
- 3. Installation and testing of furnished electric equipment and materials
- 4. General support for coordination and planning including meetings for phasing and planning.
- 5. All required electric permits and inspections
- 6. Provide power connection to process equipment, HVAC equipment and plumbing equipment
- 7. Provide conduit and wiring for process controls

## 1.6 SUBMITTALS

A. Submit the following in accordance with the Conditions of the Contract and Division 1 Specification Sections and as specified herein:

1. Shop Drawings.

- i. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.
- ii. Electric Contractor Design Drawings
- iii. Points Schedule
- iv. Riser Diagram
- v. Panelboards
- vi. Wireways
- vii. Marking strips drawings

2. Product Data

- i. Submittal shall include performance and characteristic curves.
- ii. All wiring and conductors
- iii. All devices
- iv. Circuit breakers

3. Test Reports

- i. 600-volt wiring test

4. Operation and Maintenance Data

- i. Operation and Maintenance (O&M) Instructions

5. Closeout Submittals

- i. Enclosure Keys
- ii. As-builts, All net lists and wiring diagrams

## 1.7 GENERAL REQUIREMENTS:

A. All work shall be done so as to conform to the latest edition of the Massachusetts state building Code and the National Electrical Code.

- B. All work shall be done so as to conform to all local rules, regulations, and ordinances.
- C. The Contractor shall secure and pay for all permits and inspections required by local and state regulations.
- D. It is intended to have all electrical work exposed, except for conduits and wiring installed underground, as shown on the Contract Drawings, or as directed by the Engineer at the time of installation.
- E. The right is reserved by the Owner or Owner's Representative, to make reasonable changes in locations of equipment, outlets, or wiring prior to the installation without involving additional cost or expense to the Owner.
- F. The Contractor shall visit the site of the work and familiarize himself with all available information concerning the nature of the structural, mechanical, and electrical conditions bearing on installation, transportation, handling and storage of necessary materials and equipment. Failure of the Contractor to acquaint himself with all available information concerning the above conditions will not relieve him from responsibility for estimating the difficulties and costs of successfully performing the complete work under this Contract.

#### 1.8 COORDINATION

- A. Coordination with owner
- B. Coordination with engineers of record.
- C. Coordination with process engineers and integrators.

#### 1.9 GENERAL ELECTRIC REQUIREMENTS

- A. Panel and starters shall be provided, complete with "as-built" schematic and wiring diagrams. All wires shall be numbered, as shall each terminal strip for all of the associated equipment within panels. All motor starters, circuit breakers, relays, timers and all other components shall be labeled. All wiring to remote associated equipment shall be clearly described on the diagrams with remote equipment manufacturer, terminal numbers, and locations. The Contractor shall furnish and install engraved Lamacoid nameplates for all devices.
- B. All materials shall conform to the requirements of the National Board of Fire Underwriters and shall bear applicable Underwriter's Laboratories labels. All electrical equipment shall conform to the requirements of the National Electrical Manufacturer's Association.
- C. Temporary Wiring: Temporary electrical service and wiring shall be furnished and maintained for power and lighting for the use of the Contractor during the course of construction, as specified under Section 01500, Temporary Facilities. All temporary wiring shall comply with Article 305 of the National Electrical Code.

## 1.10 GROUNDING OF EQUIPMENT

- A. All electric equipment shall be grounded per the latest requirements of the National Electric Code. The electric conduits shall not be used for purposes of grounding electrical equipment. A separate insulated grounding conductor shall be utilized. Suitable grounding clamps or lugs shall be used for connections between equipment and the grounding conductor. A grounding conductor shall be connected between panelboards and the grounding system. All panels shall be provided with a grounding bar bonded to the enclosure.

## 1.11 QUALITY ASSURANCE

### A. Regulatory Requirements

1. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" or "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Owner or Owner's Representative. Provide equipment, materials, installation, and workmanship in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

### B. Standard Products

1. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship and:
  - i. Have been in satisfactory commercial or industrial use for 2 years prior to bid opening including applications of equipment and materials under similar circumstances and of similar size.
  - ii. Have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period.
  - iii. Where two or more items of the same class of equipment are required, provide products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

### C. Alternative Qualifications

1. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
2. Material and Equipment Manufacturing Date
  - i. Products manufactured more than 3 years prior to date of delivery to site are not acceptable.

#### D. Testing qualifications

1. Contractor shall engage the services of a qualified testing organization to provide inspection, testing, calibration, and adjustment of the electrical distribution system and generation equipment listed in paragraph entitled "Acceptance Tests and Inspections" herein. Organization shall be independent of the supplier, manufacturer, and installer of the equipment. The organization shall be a first-tier subcontractor. No work required by this section of the specification shall be performed by a second-tier subcontractor.
  - i. Submit name and qualifications of organization. Organization shall have been regularly engaged in the testing of electrical materials, devices, installations, and systems for a minimum of 5 years. The organization shall have a calibration program, and test instruments used shall be calibrated in accordance with NETA ATS.
  - ii. Submit name and qualifications of the lead engineering technician performing the required testing services. Include a list of three comparable jobs performed by the technician with specific names and telephone numbers for reference. Testing, inspection, calibration, and adjustments shall be performed by an engineering technician, certified by NETA or the National Institute for Certification in Engineering Technologies (NICET) with a minimum of 5 years' experience inspecting, testing, and calibrating electrical distribution and generation equipment, systems, and devices.

#### E. Acceptance Tests and Inspections Reports

1. Submit certified copies of inspection reports and test reports. Reports shall include certification of compliance with specified requirements, identify deficiencies, and recommend corrective action when appropriate. Type and neatly bind test reports to form a part of the final record. Submit test reports documenting the results of each test not more than 10 days after test is completed.

#### F. Acceptance Test and Inspections Procedure

1. Submit test procedure reports for each item of equipment to be field tested 7 days prior to planned testing date. Do not perform testing until after test procedure has been approved.

### 1.12 DELIVERY, STORAGE, AND HANDLING

- A. All materials shall be delivered, stored and handled is responsibility of contractor.

### 1.13 ADDITIONAL REQUIREMENTS

- A. Regulatory Requirements



1. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Owners contracting person. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

B. Standard Products

1. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.14 WARRANTY

- A. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.15 POSTED OPERATING INSTRUCTIONS

- B. Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:
  1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
  2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
  3. Safety precautions.
  4. The procedure in the event of equipment failure.
  5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.
  6. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.16 MANUFACTURER'S NAMEPLATE

- A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

#### 1.17 FIELD FABRICATED NAMEPLATES

- A. ASTM D709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

#### 1.18 WARNING SIGNS

- A. Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.
- B. When the enclosure integrity of such equipment is specified to be in accordance with IEEE C57.12.28 or IEEE C57.12.29, such as for pad-mounted transformers, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPSO710D72 or approved equal.

#### 1.19 ELECTRICAL REQUIREMENTS

- A. Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

#### 1.20 INSTRUCTION TO OWNER PERSONNEL

- A. Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Owner personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required.
- B. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section.

## 2 PART 2 – PRODUCTS

### 2.1 GENERAL PRODUCT REQUIREMENTS

- A. Materials and equipment must be standard products of a manufacturer regularly engaged in the manufacturing of these and similar products. These products shall be compatible with all systems they connect and interface with. Electric contractor shall review the cabling requirements with the systems they connect to and the owner's integrator and system suppliers. FACTORY APPLIED FINISH
- B. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test and the additional requirements specified in the technical sections.
- C. As a minimum, meet requirements of UL, where UL standards are established for those items, and requirements of NFPA 70 for all materials, equipment, and devices.

### 2.2 CONDUIT AND FITTINGS

- A. Conform to the following:
  - 1. Rigid Metallic Conduit
    - i. Rigid, Threaded Zinc-Coated Steel Conduit
      - (a) ANSI C80.1, UL 6.
  - 2. Liquid-Tight Flexible Metal Conduit, Steel
    - i. UL 360.
  - 3. Fittings for Metal Conduit, EMT, and Flexible Metal Conduit
    - i. UL 514B. Ferrous fittings: cadmium- or zinc-coated in accordance with UL 514B.
  - 4. Fittings for Rigid Metal Conduit and IMC
    - i. Threaded-type. Split couplings unacceptable.
  - 5. Fittings for EMT
    - i. Steel compression type.

### 2.3 SURFACE RACEWAY

- A. Surface Metal Raceway
  - 1. UL 5, two-piece painted steel, totally enclosed, snap-cover type.

## 2.4 OUTLET BOXES AND COVERS

- A. UL 514A, cadmium- or zinc-coated, if ferrous metal. UL 514C, if nonmetallic.

## 2.5 CABINETS, JUNCTION BOXES, AND PULL BOXES

- A. Volume greater than 100 cubic inches, UL 50, hot-dip, zinc-coated, if sheet steel.
- B. Hinged covers
- C. Enclosed and gasket
- D. NEMA 4X, Stainless Metallic with hubs.

## 2.6 WIRES AND CABLES

- A. Provide wires and cables in accordance applicable requirements of NFPA 70 and UL for type of insulation, jacket, and conductor specified or indicated. Do not use wires and cables manufactured more than 12 months prior to date of delivery to site.

### B. Conductors

#### 1. Provide the following:

- i. Conductor sizes and capacities shown are based on copper, unless indicated otherwise.
- ii. Conductors No. 10 AWG and larger diameter: stranded.
- iii. Conductors No. 12 AWG and smaller diameter: solid.

- (a) Conductors for remote control, alarm, and signal circuits, classes 1, 2, and 3: stranded unless specifically indicated otherwise.
- (b) All conductors: copper.

### C. Minimum Conductor Sizes

#### 1. Provide minimum conductor size in accordance with the following:

- i. Branch circuits: No. 12 AWG.
- ii. Class 1 remote-control and signal circuits: No. 14 AWG.
- iii. Class 2 low-energy, remote-control and signal circuits: No. 16 AWG.
- iv. Class 3 low-energy, remote-control, alarm and signal circuits: No. 22 AWG.

### D. Color Coding

- 1. Provide color coding for service, feeder, branch, control, and signaling circuit conductors.

#### E. Ground and Neutral Conductors

1. Provide color coding of ground and neutral conductors as follows:
  - i. Grounding conductors: Green.
  - ii. Neutral conductors: White.
  - iii. Exception, where neutrals of more than one system are installed in same raceway or box, other neutrals color coding: white with a different colored (not green) stripe for each.

#### F. Ungrounded Conductors

1. Provide color coding of ungrounded conductors in different voltage systems as follows:
  - i. 208/120 volt, three-phase
    - (a) Phase A - black
    - (b) Phase B - red
    - (c) Phase C – blue
  - ii. 480/277 volt, three-phase
    - (a) Phase A - brown
    - (b) Phase B - orange
    - (c) Phase C – yellow

#### G. Insulation

1. Unless specified or indicated otherwise or required by NFPA 70, provide power and lighting wires rated for 600-volts, Type THWN/THHN conforming to UL 83, except that grounding wire may be type TW conforming to UL 83; remote-control and signal circuits: Type TW or TF, conforming to UL 83. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better.

#### H. Bonding Conductors

1. ASTM B1, solid bare copper wire for sizes No. 8 AWG and smaller diameter; ASTM B8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger diameter.

### 2.7 SPLICES AND TERMINATION COMPONENTS

- A. UL 486A-486B for wire connectors and UL 510 for insulating tapes. Connectors for No. 10 AWG and smaller diameter wires: insulated, pressure-type in accordance with

UL 486A-486B or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

## 2.8 DISCONNECT SWITCHES

- A. NEMA KS 1. Provide heavy duty-type switches where indicated, where switches are rated higher than 240 volts, and for double-throw switches. Utilize Class R fuse-holders and fuses for fused switches, unless indicated otherwise. Provide horsepower rated for switches serving as the motor-disconnect means. Provide switches in NEMA enclosure type 1 or 3R for interior and exterior locations respectively, enclosure per NEMA ICS 6.

## 2.9 PANELBOARDS

- A. For owner's distribution system provide panelboards in accordance with the following:

1. UL 67 and UL 50 having a short-circuit current rating as indicated.
2. All panel board busses shall be tin plated copper.
3. Panelboards for use as service disconnecting means: additionally, conform to UL 869A.
4. Panelboards: circuit breaker equipped.
5. Designed such that individual breakers can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as means of obtaining clearances as required by UL.
6. "Specific breaker placement" is required in panelboards to match the breaker placement indicated in the panelboard schedule on the drawings.
7. Use of "Sub-feed Breakers" is not acceptable unless specifically indicated otherwise.
8. Main breaker: "separately" mounted "above" branch breakers.
9. Where "space only" is indicated, make provisions for future installation of breakers.
10. Directories: indicate load served by each circuit in panelboard.
11. Directories: indicate source of service to panelboard (e.g., Panel PA served from Panel MDP).
12. Type directories and mount in holder behind transparent protective covering.
13. Panelboards: listed and labeled for their intended use.
14. Panelboard nameplates: provided in accordance with paragraph FIELD FABRICATED NAMEPLATES.

### B. Enclosure

1. Provide panelboard enclosure in accordance with the following:
  - i. UL 50.
  - ii. Cabinets mounted outdoors or flush-mounted: hot-dipped galvanized after fabrication.
  - iii. Cabinets: painted in accordance with paragraph PAINTING.

- iv. Outdoor cabinets: NEMA 3R raintight with a removable steel plate 1/4 inch thick in the bottom for field drilling for conduit connections.
- v. Front edges of cabinets: form-flanged or fitted with structural shapes welded or riveted to the sheet steel, for supporting the panelboard front.
- vi. All cabinets: fabricated such that no part of any surface on the finished cabinet deviates from a true plane by more than 1/8 inch.
- vii. Holes: provided in the back of indoor surface-mounted cabinets, with outside spacers and inside stiffeners, for mounting the cabinets with a 1/2 inch clear space between the back of the cabinet and the wall surface.
- viii. Flush doors: mounted on hinges that expose only the hinge roll to view when the door is closed.
- ix. Each door: fitted with a combined catch and lock, except that doors over 24 inches long provided with a three-point latch having a knob with a T-handle, and a cylinder lock.
- x. Keys: two provided with each lock, with all locks keyed alike.
- xi. Finished-head cap screws: provided for mounting the panelboard fronts on the cabinets.

#### C. Panelboard Buses

- 1. All busses shall be tin plated copper, Support bus bars on bases independent of circuit breakers. Design main buses and back pans so that breakers may be changed without machining, drilling, or tapping. Provide isolated neutral bus in each panel for connection of circuit neutral conductors. Provide separate ground bus identified as equipment grounding bus per UL 67 for connecting grounding conductors; bond to steel cabinet. In addition to equipment grounding bus, provide second "isolated" ground bus, where indicated.

#### D. Circuit Breakers

- 1. Unless otherwise indicated provide breakers with thermal magnetic-trip units.
- 2. Bolt on UL 489, thermal- magnetic type having a minimum short-circuit current rating equal to the short-circuit current rating of the panelboard in which the circuit breaker will be mounted. Breaker terminals: UL listed as suitable for type of conductor provided. Where indicated on the drawings, provide circuit breakers with shunt trip devices. Series rated circuit breakers and plug-in circuit breakers are unacceptable.

#### E. Multipole Breakers

- 1. Provide common trip-type with single operating handle. Design breaker such that overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.

## 2.10 LOCKOUT REQUIREMENTS

- A. Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Comply with requirements of Division 15, "Mechanical" for mechanical isolation of machines and other equipment.

## 2.11 GROUNDING AND BONDING EQUIPMENT

- A. All grounding and bonding equipment shall be UL listed.
- B. Large pipe clamps shall be Greaves CG series extra heavy-duty bronze castings sized for pipe.

## 2.12 PRODUCTS FOR PROCESS CONTROLS AND INSTRUMENTATION

### A. Operation Environment

1. Unless otherwise specified, provide products rated for continuous operation under the following conditions:
  - i. Pressure: Pressure conditions normally encountered in the installed location.
  - ii. Vibration: Vibration conditions normally encountered in the installed location.
  - iii. Temperature:
    - (a) Products installed indoors: Ambient temperatures in the range of 32 to 112 degrees F and temperature conditions outside this range normally encountered at the installed location.
  - iv. Humidity: 10 to 95 percent relative humidity, noncondensing and humidity conditions outside this range normally encountered at the installed location.

### B. Enclosures

1. Enclosures supplied as an integral (pre-packaged) part of another product are acceptable. Provide two Enclosure Keys for each lockable enclosure on a single ring per enclosure with a tag identifying the enclosure the keys operate. Provide enclosures meeting the following minimum requirements:
2. Outdoors
  - i. For enclosures located outdoors, provide enclosures meeting NEMA 250 Type 4X stainless steel requirements.
3. Mechanical and Electrical Rooms
  - i. For enclosures located in mechanical or electrical rooms, provide enclosures meeting NEMA 250 Type 1 requirements.



4. Other Locations not listed above or in process areas

- i. For enclosures in other locations not listed above or in process areas including but not limited to occupied spaces, above ceilings, and in plenum returns, provide enclosures meeting NEMA 250 Type 1 requirements.

5. Process Areas Enclosures

- i. For enclosures and junction boxes in all process areas, pump rooms and chemical areas shall be NEMA 4x

C. Wire and Cable

1. Provide wire and cable meeting the requirements of NFPA 70 and NFPA 90A in addition to the requirements of this specification and referenced specifications.

2. Terminal Blocks

- i. For terminal blocks which are not integral to other equipment, provide terminal blocks which are insulated, modular, feed-through, clamp style with recessed captive screw-type clamping mechanism, suitable for DIN rail mounting, and which have enclosed sides or end plates and partition plates for separation.

3. Control Wiring for Binary Signals

- i. For Control Wiring for Binary Signals, provide 18 AWG copper or thicker wire rated for 300-volt service. In general control wiring for between enclosures and equipment shall be unshielded twisted pair unless approved by SCADA vendor prior to rough in and maybe with other signals of the same type in a single cable (multipair cable).

4. Control Wiring for Analog Signals

- i. For Control Wiring for Analog Signals, provide 18 AWG or thicker, copper, single shielded twisted PAIR wire meeting the following requirements:
  - (a) minimum 2 inch lay of twist
  - (b) 100 percent shielded of twisted pair with at least 300-volt insulation.
  - (c) The pair has a 20 AWG tinned-copper drain wire and individual overall insulation.
  - (d) cables have an overall aluminum-polyester or tinned-copper cable-shield tape, overall 20 AWG tinned-copper cable drain wire, and overall cable insulation. Example: Beldon type 1032a for non-plenum locations.
- ii. Power Wiring for Control Devices.

- (a) For 24-volt circuits, provide insulated copper 18 AWG or thicker wire rated for 300 VAC service. For 120-volt circuits, provide 14 AWG or thicker stranded copper wire rated for 600-volt service.

## 2.13 Reduced Voltage Starters and Electronic Soft Starters for Motors

- A. Provide motor electronic soft starting with bypass contactor shall be solid state.
- B. Solid State soft-start starters shall be three phase IGBT controlled for stepless reduced voltage starting of induction motors. Current transformers shall provide feedback signal to regulate torque during start up and to prevent overload conditions while motor is running. Starter shall have starting current settable and rated for up to 300 percent of full load amps for thirty seconds, bypass/isolation contactor, and three phase thermal overload relay.

### 1. Auxiliary Contacts

- i. Each controller shall be provided with a minimum of three auxiliary contacts which can be easily changed from normally open to normally closed. Where indicated on the drawings, a fourth auxiliary contact and red and green indicating lights shall be provided.

### 2. Overload Relays

- i. Except as otherwise indicated, each controller shall be provided three fully adjustable electronic thermal overload relays with external manual reset.

### 3. Individual Control Transformers

- i. Primary fuses for individual control transformers are given as an option. For less than 50 VA, they are not required or desired. Please refer to NFPA 70 section 430-72(c).
- ii. Where 120 volt ac control of contactors is indicated or required, individual control transformer shall be provided on the line side of the unit disconnect. The control transformers shall be rated 480-120 volts and shall conform to the requirements for control transformers in NEMA ST 1. Control transformers shall have adequate volt-ampere capacity for the control functions indicated. Transformers shall be installed with primary fuses. Primary fuses shall be Class J. Except as otherwise indicated on the drawings, each control transformer shall be provided with a fuse in one secondary lead and shall have the other secondary lead grounded.

### 4. Voltage Fault Protection

- i. Starters shall be provided with protection against voltage faults, phase unbalance, phase loss, phase reversal, undervoltage and overvoltage. Upon sensing one of these faults, the protector shall de-energize the starter. The protector shall use a combination of voltage and phase-angle sensing to detect

phase loss even when regenerated voltages are present. The protector shall be connected to the load side of the motor circuit disconnect. The protector shall have an adjustable line voltage trip level, adjustable trip delay, automatic reset and manual reset by an external normally closed push-button, and Double Pull Double Throw (DPDT) output contacts. Protector operation shall have repeatability of +1 percent of set point, maximum, and a dead band of 2 percent maximum. Protector shall have green indicator to show normal status and red indicator to show tripped status. Indicators will be visible through the compartment door, when LED's are used protector shall be covered with a clear unbreakable cover, when lamps are used they shall have nameplates and be grouped with other indicating lights.

## 5. Wiring for Motor Control

- i. All wiring shall meet the requirements of paragraph WIRING above. Provide heavy-duty clamp type terminals for terminating all power cables entering the control centers.
- ii. Contractor's Wiring
  - (a) The Contractor's wiring shall be formed into groups, suitably bound together, properly supported and run straight horizontally or vertically. There shall be no splices in the wiring. The manufacturer's standard pressure-type wire terminations for connections to internal devices will be acceptable. Terminal blocks shall be added for wiring to devices having leads instead of terminals. Ring tongue indented terminals shall be used on all wires terminated on control terminal blocks for external or inter-panel connections and at shipping splits. All stud terminals shall have contact nuts and either locking nuts or lock washers.
- iii. Terminal Blocks
  - (a) In no case shall the terminals provided for circuit breakers or contactors accommodate less than the number or size of conductors shown on the drawings. Special attention shall be given to wiring and terminal arrangement on the terminal blocks to permit the individual conductors of each external cable to be terminated on adjacent terminal points.
- iv. Control Transformers
  - (a) The control transformers shall be rated 480-120 volts and shall conform to the requirements for control transformers in NEMA ST 1. Control transformers shall have adequate volt-ampere capacity for the control functions indicated and an additional 10 percent capacity. Transformers shall be installed without primary fuses. Except as otherwise indicated on the drawings, each unit compartment shall provide a fuse for control power in one secondary lead and shall have the other secondary lead grounded. The unit disconnect shall be equipped with a normally open contact to

isolate the control circuit from the source when the controller disconnect is open.

### 3 PART 3 – EXECUTION

#### 3.1 GENERAL

- A. Electrical installations, including weatherproof and hazardous locations and ducts, plenums and other air-handling spaces: conform to requirements of NFPA 70 and IEEE C2 and to requirements specified herein.
- B. Field Applied Painting
  - 1. Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.
- C. Field Fabricated Nameplate Mounting
  - 1. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.
- D. Warning Sign Mounting
  - 1. Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

#### 3.2 WIRING METHODS

- A. Provide insulated conductors installed in Galvanized rigid steel conduit, IMC, except where specifically indicated or specified otherwise or required by NFPA 70 to be installed otherwise.
- B. Grounding conductor: separate from electrical system neutral conductor. Provide insulated green equipment grounding conductor for circuit(s) installed in conduit and raceways.
- C. Shared neutral, or multi-wire branch circuits, are not permitted with arc-fault circuit interrupters. Minimum conduit size: 1/2 inch in diameter for low voltage lighting and power circuits.
- D. Fire caulked or in fire-rated shafts, with metal conduit extending through shafts for minimum distance of 6 inches.
- E. Firestop conduit which penetrates fire-rated walls, fire-rated partitions, or fire-rated floors in accordance with FIRESTOPPING in [Section 02901 – Misc Work and Cleanup](#).

#### F. Pull Wire

1. Install pull wires in empty conduits. Pull wire: plastic having minimum 200-pound force tensile strength. Leave minimum 36 inches of slack at each end of pull wire.

### 3.3 CONDUIT INSTALLATION

- A. Unless indicated otherwise, conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of flues and steam or hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit will be visible after completion of project.

#### B. Restrictions Applicable to Flexible Conduit

1. Use only as specified in paragraph FLEXIBLE CONNECTIONS. Use for last few feet.

#### C. Underground Conduit

1. Rigid steel, Trench and backfill by GC; Conduit and Wire by Division 16

#### D. Conduit Support

1. Support conduit by pipe straps, wall brackets, threaded rod conduit hangers, or ceiling trapeze. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. Do not exceed one-fourth proof test load for load applied to fasteners. Provide vibration resistant and shock-resistant fasteners attached to concrete ceiling. Do not cut main reinforcing bars for any holes cut to depth of more than 1 1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete joints. Fill unused holes. In partitions of light steel construction, use sheet metal screws. In suspended-ceiling construction, run conduit above ceiling. Do not support conduit by ceiling support system. Conduit and box systems: supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed. Do not share supporting means between electrical raceways and mechanical piping or ducts. Coordinate installation with above-ceiling mechanical systems to assure maximum accessibility to all systems. Spring-steel fasteners may be used for lighting branch circuit conduit supports in suspended ceilings in dry locations. Support exposed risers in wire shafts of multistory buildings by U-clamp hangers at each floor level and at 10 foot maximum intervals. Where conduit crosses building expansion joints, provide suitable watertight expansion fitting that maintains conduit electrical continuity by bonding jumpers or other means. For

conduits greater than 2 1/2 inches inside diameter, provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

2. Directional Changes in Conduit Runs

- i. Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3. Locknuts and Bushings

- i. Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing. Provide locknuts with sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.

4. Flexible Connections

- i. Provide liquid-tight flexible nonmetallic conduit in wet and damp locations for equipment subject to vibration, noise transmission, movement or motors. Provide separate ground conductor across flexible connections.

### 3.4 BOXES, OUTLETS, AND SUPPORTS

- A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
- B. Boxes for metallic raceways: cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, and when specifically indicated. Boxes in other locations: sheet steel
- C. Provide each box with volume required by NFPA 70 for number of conductors enclosed in box. Boxes for mounting lighting fixtures: minimum 4 inches square, or octagonal, except that smaller boxes may be installed as required by fixture configurations, as approved.
- D. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces. Provide separate boxes for flush or recessed fixtures when required by fixture terminal operating temperature; provide readily removable fixtures for access to boxes unless ceiling access panels are provided.
- E. Support boxes and pendants for surface-mounted fixtures on suspended ceilings independently of ceiling supports. Fasten boxes and supports with wood screws on

wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. Threaded studs driven in by powder charge and provided with lockwashers and nuts or nail-type nylon anchors may be used in lieu of wood screws, expansion shields, or machine screws. In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from building structure or by bar hangers. Where bar hangers are used, attach bar to raceways on opposite sides of box, and support raceway with approved-type fastener maximum 24 inches from box. When penetrating reinforced concrete members, avoid cutting reinforcing steel.

#### F. Boxes

1. Boxes for use with raceway systems: minimum 1 1/2 inches deep, except where shallower boxes required by structural conditions are approved. Boxes for other than lighting fixture outlets: minimum 4 inches square, except that 4 by 2 inch boxes may be used where only one raceway enters outlet. Telecommunications outlets: a minimum of 4 inches square by 2 1/8 inches deep. Mount outlet boxes flush in finished walls.

#### G. Pull Boxes

1. Construct of at least minimum size required by NFPA 70 of code-gauge aluminum or galvanized sheet steel, and compatible with nonmetallic raceway systems, except where cast-metal boxes are required in locations specified herein. Provide boxes with screw-fastened covers. Where several feeders pass through common pull box, tag feeders to indicate clearly electrical characteristics, circuit number, and panel designation.

### 3.5 MOUNTING HEIGHTS

- A. Mount panelboards, enclosed circuit breakers, and disconnecting switches so height of operating handle at its highest position is maximum 78 inches above floor. Mount lighting switches and handicapped telecommunication for entry door stations at 48 inches above finished floor. Mount receptacles and telecommunications outlets 18 inches above finished floor, unless otherwise indicated.

### 3.6 CONDUCTOR IDENTIFICATION

- A. Provide conductor identification within each enclosure where tap, splice, or termination is made. For conductors No. 6 AWG and smaller diameter, provide color coding by factory-applied, color-impregnated insulation. For conductors No. 4 AWG and larger diameter, provide color coding by plastic-coated, self-sticking markers; colored nylon cable ties and plates; or heat shrink-type sleeves. Identify control circuit terminations in accordance with manufacturer's recommendations.

#### B. Marking Strips

1. Provide marking strips in accordance with the following:
  - i. Provide white or other light-colored plastic marking strips, fastened by screws to each terminal block, for wire designations.
  - ii. Use permanent ink for the wire numbers
  - iii. Provide reversible marking strips to permit marking both sides or provide two marking strips with each block.
  - iv. Size marking strips to accommodate the two sets of wire numbers.
  - v. Assign a device designation in accordance with NEMA ICS 1 to each device to which a connection is made. Mark each device terminal to which a connection is made with a distinct terminal marking corresponding to the wire designation used on the Contractor's schematic and connection diagrams.
2. The wire (terminal point) designations used on the Contractor's wiring diagrams and printed on terminal block marking strips may be according to the Contractor's standard practice; however, provide additional wire and cable designations for identification of remote (external) circuits for the Owner or Owner's Representative's wire designations.
3. Prints of the marking strips drawings submitted for approval will be so marked and returned to the Contractor for addition of the designations to the terminal strips and tracings, along with any rearrangement of points required.

#### C. Splices

1. Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller diameter with insulated, pressure-type connector. Make splices in conductors No. 8 AWG and larger diameter with solderless connector, and cover with insulation material equivalent to conductor insulation.

#### D. Covers and Device Plates

1. Install with edges in continuous contact with finished wall surfaces without use of mats or similar devices. Plaster fillings are not permitted. Install plates with alignment tolerance of 1/16 inch. Use of sectional-type device plates are not permitted. Provide gasket for plates installed in wet locations.

#### E. Electrical Penetrations

1. Seal openings around electrical penetrations through fire resistance-rated walls, partitions, floors, or ceilings in accordance with Section FIRESTOPPING Section 02901 – Misc Work and Cleanup.

#### F. Grounding and Bonding

1. Provide in accordance with NFPA 70. Ground exposed, non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding



conductor in metallic and nonmetallic raceways, telecommunications system grounds, grounding conductor of nonmetallic sheathed cables, and neutral conductor of wiring systems. Make ground connection at main service equipment and extend grounding conductor to point of entrance of metallic water service. Make connection to water pipe by suitable ground clamp or lug connection to plugged tee. If flanged pipes are encountered, make connection with lug bolted to street side of flanged connection. Supplement metallic water service grounding system with additional made electrode in compliance with NFPA 70. Make ground connection to driven ground rods on exterior of building. Interconnect all grounding media in or on the structure to provide a common ground potential. This includes lightning protection, electrical service, telecommunications system grounds, as well as underground metallic piping systems. Make interconnection to the gas line on the customer's side of the meter. Use main size lightning conductors for interconnecting these grounding systems to the lightning protection system. In addition to the requirements specified herein, provide telecommunications grounding in accordance with TIA-607. Where ground fault protection is employed, ensure that connection of ground and neutral does not interfere with correct operation of fault protection.

#### G. Equipment Connections

1. Provide power wiring for the connection of motors and control equipment under this section of the specification. Except as otherwise specifically noted or specified, automatic control wiring, control devices, and protective devices within the control circuitry are not included in this section of the specifications and are provided under the section specifying the associated equipment.

#### 3.7 FIELD FABRICATED NAMEPLATE MOUNTING

- A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

#### 3.8 WARNING SIGN MOUNTING

- A. Provide the number of signs required to be readable from each accessible side. Space the signs in accordance with NFPA 70E.

#### 3.9 FIELD APPLIED PAINTING

- A. Where field painting of enclosures for panelboards, load centers or the like is specified, to correct damage to the manufacturer's factory applied coatings, or to meet the indicated or specified safety criteria, provide manufacturer's recommended coatings and apply in accordance to manufacturer's instructions.

#### 3.10 FIELD QUALITY CONTROL

- A. Furnish test equipment and personnel and submit written copies of test results. Give Owner or Owner's Representative 5 working days' notice, prior to ALL tests.

B. Devices Subject to Manual Operation

1. Operate each device subject to manual operation at least five times, demonstrating satisfactory operation each time.

C. 600-Volt Wiring Test

1. Test wiring rated 600 volt and less to verify that no short circuits or accidental grounds exist. Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 500 volts to provide direct reading of resistance. Minimum resistance: 250,000 ohms.

3.11 INSTALLATION OF PROCESS CONTROLS AND INSTRUMENTATION WIRING

A. Fully install and test the wiring and conduits for the control systems.

B. Penetrations in Building Exterior

1. Make all penetrations through and mounting holes in the building exterior watertight.

3.12 ACCEPTANCE TESTS AND INSPECTIONS

A. Testing organization shall perform acceptance tests and inspections. Test methods, procedures, and test values shall be performed and evaluated in accordance with NETA ATS, the Manufacturer's Recommendations, and paragraph entitled "Field Quality Control" of each applicable specification section. Tests identified as optional in NETA ATS are not required unless otherwise specified. Equipment shall be placed in service only after completion of required tests and evaluation of the test results have been completed. Contractor shall supply to the testing organization complete sets of shop drawings, settings of adjustable devices, and other information necessary for an accurate test and inspection of the system prior to the performance of any final testing. Owner or Owner's Representative shall be notified at least 14 days in advance of when tests will be conducted by the testing organization. Perform acceptance tests and inspections on applicable equipment and systems specified in the following:

1. Motor starter and Motor starter with motor. NETA sections

- i. NETA ATS 7.15.1 Rotating Machinery, AC Induction Motors and Generators
- ii. NETA ATS 7.16.1.1 Motor Control, Motor Starters, Low-Voltage

2. NETA ATS 7.22.3 Emergency Systems, Automatic Transfer Switches

3.13 SYSTEM ACCEPTANCE

- A. Final acceptance of the system is contingent upon satisfactory completion of acceptance tests and inspections.

#### 3.14 PLACING EQUIPMENT IN SERVICE

- A. A representative of the approved testing organization shall be present when equipment tested by the organization is initially energized and placed in service.

#### 3.15 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 – Contract Closeout

END OF SECTION 16001