

Taunton, Massachusetts

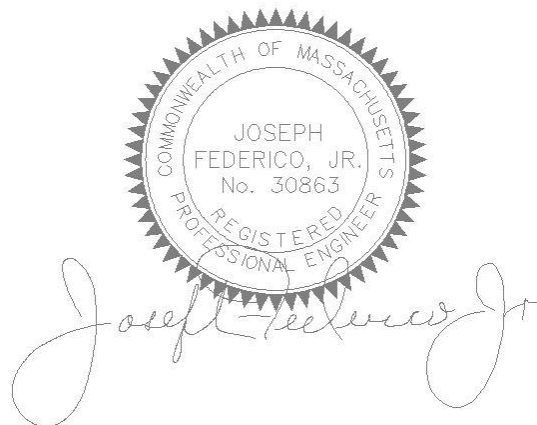
2023 Pump Station Improvements

Contract No. S-2023-2, CWSRF No. 7210

July 18, 2023

Bidding Requirements, Bond Forms, Contract Agreement, Conditions of the Contract and Technical Specifications

Bid Specifications



Professional Registration No.: 30863



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DIVISION 00

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SECTION 00100
INVITATION TO BID
CITY OF TAUNTON, MA
2023 PUMP STATION IMPROVEMENTS
CONTRACT S-2023-2
CWSRF NO. 7210

On behalf of the City of Taunton, MA (“City” or “Owner”), Veolia Water North America-Northeast, LLC (“Veolia” or “Company”) is seeking bids for **2023 Pump Station Improvements, project**. Veolia has firms to provide bids for this project.

Schedule of Events:

	Event / Activity	Action Required	Deadline
1	Veolia distributes Bidding Documents		July 25, 2023
2	Non-mandatory Pre Bid Meeting	Location: Myles Standish Pump Station 700 Myles Standish Boulevard Taunton, MA	August 2, 2023, at 10:00 AM EDT
3	Bidders Submit Questions	Submit questions to Nick LoBianco nicholas.lobianco@veolia.com NOTE: Veolia will provide answers to questions and distribute to all participating bidders	August 11, 2023
4	Submission of Bids	Send your Bids to Veolia via email: nicholas.lobianco@veolia.com	4:00pm EDT August 22, 2023

Sealed Bids for the construction of the 2023 Pump Station Improvements project shall be sent to Nick LoBianco, via electronic mail, at nicholas.lobianco@veolia.com. All bids must be received by 4:00 PM, August 22, 2023 in Portable Document Format (PDF).

The following documents must be included with the Bid Form:

- Appendix A1 - Certification Statement
- Appendix B - Diesel Retrofit Program - Statement of Intent to Comply
- Bid Bond

The subject line of the email submittal should read:
 BID – 2023 Pump Station Improvements, CWSRF 7210.

The work in this Contract includes, but is not limited to:

- Myles Standish Boulevard Wastewater Pumping Station
 - Full pumping station rehabilitation including, but not limited to, new submersible pumps, piping, electrical and instrumentation associated with a new submersible wastewater pumping station
- Partridge Circle Wastewater Pumping Station
 - Removal of existing submersible pump and installation of new pump and guide rails
- Wellesley Circle Wastewater Pumping Station
 - Conversion to submersible pump station
- School Street Wastewater Pumping Station

- Replacement of existing generator
- Stevens Street Wastewater Pumping Station
 - Replacement of existing generator
- Davis Street Wastewater Pumping Station
 - Convert existing power (Single Phase to 3-Phase)
- Industrial Park Wastewater Pumping Station
 - Replacement of existing generator
- Startup of new equipment, demonstration of control strategies, and activation of pumping station improvements
- Electrical work as shown in the contract documents - Electrical drawings and Specifications Division 16
- Provide and install instrumentation and control under Division 13 and Division 11
- Safety Requirements:
 - The Subcontractor is to meet and review the Veolia safety plan for this facility prior to initiating work and shall submit a site-specific safety plan. The minimum PPE requirements are Steel toed boots, ANSI approved hard hats, and ANSI approved safety glasses.
 - Certain tasks may require additional personnel protective equipment - such as a respirator, hearing protection, fall protection, tyvek suits. Prior to performing these tasks - a job site safety analysis must be facilitated.

Tasks and details for the work are specified in the Contract Documents, and provided in the Construction Agreement, Exhibit A - Scope of Work.

The Subcontractor shall complete all work required under the Contract within 950 calendar days after the date of the Notice of Award. Work performed beyond the completion date will be subjected to liquidated damages in the amount specified herein. Time of completion reflects current supply chain issues related to electrical equipment. The bidders' attention is directed to Exhibit A, and Contract specification Section 01010 for Contract milestone dates.

A pre-bid conference will not be scheduled. Invited bidders can schedule site visits by contacting Nick LoBianco at (508) 828-8565. Veolia will transmit to all prospective Bidders of record such Addenda as Veolia considers necessary in response to questions. Oral statements may not be relied upon and will not be binding or legally effective.

A .pdf copy of the Contract Documents for the Work may be obtained from the office of Veolia by contacting Nick LoBianco at (508) 828-8565, nicholas.lobianco@veolia.com. Hard copies will not be provided. The Contract Documents may be examined during normal business hours from 7:00 a.m. to 3:30 p.m. at the following location:

Taunton Wastewater Treatment Facility
825 West Water Street
Taunton, MA 02780

This Contract to be awarded as the result of this Invitation for Bid is funded through the Massachusetts Department of Environmental Protection, Bureau of Resource Protection, by loans from the Massachusetts Clean Water Trust (the "Trust"). This Contract will be subject to the Department of Environmental Protection regulations contained in 310 CMR 44.00, "DEP Selection, Approval and Regulation of Water Pollution Abatement Projects Receiving Financial Assistance from the State Revolving Fund" in effect on the date of issuance of the assistance award (DEP Project Approval Certificate) by the Department.

The Project requires compliance with the Massachusetts Department of Environmental Protection Diesel Retrofit Program (MDRP) by use of engine emission controls that are EPA certified, or their equivalent, on all diesel-powered non-road construction equipment used at the job site. Bidders must submit a signed and dated Statement of Intent to Comply as part of their Bid Proposal Document. The Statement of Intent to Comply is attached as Appendix B to the Agreement.

Failure to comply with these DEP requirements may be deemed to render a proposal nonresponsive. No waiver of any provision of these DEP requirements will be granted unless approved by the Department of Environmental Protection.

As Security, each Bid must be accompanied by a Bid Bond having as surety thereto, such Surety Company or Companies as are authorized to do business in the State of Massachusetts of an amount not less than five (5) percent of the Bid. No bid will be accepted unless accompanied by the required bid deposit.

For the successful Bidder a Performance Bond and a Payment Bond, each in the amount of 100 percent of the Contract Price, will be required in the form described in Exhibit J to the Agreement. All such bonds shall be issued by eligible sureties listed in the current US Department of Treasury Circular 570, qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Owner.

Bidders shall not include Federal Excise Taxes or State of Massachusetts Sales Taxes from which Public Building Projects are exempt.

No Bidder may withdraw its Bid within 30 days (Saturdays, Sundays and legal holidays excluded) after the actual date of the Bid Opening.

Veolia reserves the right to accept any Bid, waive any informalities or minor defects, or reject any or all Bids, if in its sole judgment it is in the best interest of Veolia to do so. Veolia does not discriminate on the basis of sex, race, age, physical disability, religion or national origin.

Disadvantaged Business Enterprise (DBE) goals are applicable to the total dollars paid to the construction contract. The goals for this project are a minimum of **6.7 percent D/MBE participation and 7.2 percent D/WBE participation by certified DBEs**. The two low bidders shall submit completed DBE forms (EEO-DEP-190C, EEO-DEP-191C and the DBE Certification of United States Citizenship form) by the close of business on the third business day after bid opening. Failure to comply with the requirements of this paragraph may be deemed to render a proposal non-responsive. No waiver of any provision of this section will be granted unless approved by the Department of Environmental Protection (MassDEP).

Minimum Wage Rates as determined by the Executive Office of Labor and Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request, if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract. Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this project.

Veolia reserves the right to waive any informality in or to reject any or all Bids if deemed to be in its best interest.

All questions shall be directed in writing via e-mail to Veolia: Attn: Nick LoBianco, nicholas.lobianco@veolia.com

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SECTION 00200

INSTRUCTIONS TO BIDDERS

ARTICLE 1. INVESTIGATION OF BIDDERS

1.1 The investigation of a Bidder will seek to determine whether available equipment and financial resources are adequate to assure Veolia that the Goods and Services will be delivered in accordance with the terms of the Agreement.

1.2 In evaluating Bids, Veolia will consider the qualifications of only those Bidders whose Bids are in compliance with the prescribed requirements.

1.3 Veolia reserves the right to reject any Bid if the evidence submitted by, or the investigation of, such Bidder fails to satisfy Veolia that such Bidder is properly qualified to carry out the obligations of the Procurement Documents and to complete the Goods and Services contemplated therein.

ARTICLE 2. COPIES OF PROCUREMENT DOCUMENTS

2.1 Complete sets of Procurement Documents shall be used in preparing Bids; neither Veolia nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Procurement Documents.

2.2 Veolia and Engineer in making copies of Procurement Documents available do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

ARTICLE 3. EXAMINATION OF PROCUREMENT DOCUMENTS

3.1 Before submitting a Bid, each Bidder must (a) examine the Procurement Documents thoroughly, (b) become familiar with Federal, State and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (c) study and carefully correlate Bidder's observations with the requirements of the Procurement Documents.

3.2 The submission of a Bid will constitute an incontrovertible representation that the Bidder has complied with every requirement of this Article 3 and that the Procurement Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for providing the Goods and Services.

ARTICLE 4. INTERPRETATIONS

4.1 All questions about the meaning or intent of the Procurement Documents shall be received **via e-mail** by Veolia, Attn: Nick LoBianco at (508) 828-8565, nicholas.lobianco@veolia.com at least ten days before the date herein set for the opening of bids.

4.2 Written clarifications or interpretations will be issued by Addenda not later than five days before the bid opening date. Only questions answered by formal written Addenda will be binding. Oral and other clarifications or interpretations will be without legal effect. Addenda will be e-mailed to all parties recorded as having received the Procurement Documents.

4.3 Bidders are responsible for determining that they have received all Addenda issued.

ARTICLE 5. PRE-BID CONFERENCE

5.1 A non-mandatory pre-bid conference will on the date and time specified in Section 00100. Invited Bidders can visit the sites at this time. Veolia will transmit to all prospective Bidders of record such Addenda as Veolia considers necessary in response to questions. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6. BID FORM

6.1 Each Bid shall be submitted on the Bid Form on the pages appended to the Procurement Documents. One such copy of the Bid Form shall be removed and submitted separately. All blank spaces must be filled in.

6.2 Bid Forms shall be completed in ink or by typewriter. The Bid price of each item on the form shall be stated in words, and figures. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

6.3 Firm bids are required. Conditional bids will not be considered.

6.4 Bids by corporations shall be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

6.5 Bids by Limited Liability Companies shall be executed in the Limited Liability name by the Manager (or other Limited Liability Company officer/representative accompanied by evidence of authority to sign.) The Limited Liability Company address and state where the Limited Liability Company was formed shall be shown below the signature.

6.6 Bids by partnerships shall be executed in the partnership name and signed by a partner, whose title shall appear under the signature. The official address of the partnership shall be shown below the signature.

6.7 All names shall be typed or printed below the signature.

6.8 The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

6.9 The address to which communications regarding the Bid are to be directed shall be shown.

6.10 One copy of each Bid shall be submitted via e-mail.

ARTICLE 7. RECEIPT OF BIDS

7.1 Bids will be received at the time and place indicated in the Invitation to Bid.

7.2 Veolia may consider informal any Bid not prepared and submitted in accordance with the provisions hereof.

7.3 Bidders are cautioned that it is the responsibility of each individual bidder to assure that their bid is in the possession of the responsible official or the designated alternate prior to the stated time and at the place of the Bid Opening. Owner is not responsible for bids delayed by e-mail services, of any nature.

ARTICLE 8. MODIFICATION AND WITHDRAWAL OF BIDS

8.1 Bids may be modified only by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

8.2 Bids may be withdrawn prior to the scheduled time (or authorized postponement thereof) for the opening of Bids.

8.3 Any Bid received after the time and date specified shall not be considered. No Bid may be withdrawn for a period of thirty days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids.

ARTICLE 9. AWARD OF CONTRACT

9.1 The Contract will be awarded to the lowest responsible and eligible Bidder (Successful Bidder). Such a Bidder shall possess the skill, ability, and integrity necessary for the faithful performance of the work. The term "lowest responsible and eligible Bidder" as used herein shall mean the Bidder whose Bid is the lowest of those Bidders possessing the skill, ability, and integrity necessary to the faithful performance of the Work.

9.2 Veolia reserves the right to reject any and all Bids, to waive any and all informalities if it is in Veolia's best interest to do so, and the right to disregard all nonconforming, non-responsive or conditional Bids.

9.3 If the Contract is to be awarded, Veolia will give the Successful Bidder an agreement within sixty days, excluding Saturdays, Sundays, and legal holidays.

9.4 The Owner may elect to increase the scope of work by selecting, in order, any of the add alternates listed in the Bid Form, such that no single alternate will be considered unless every alternate preceding it on the list has been added to the Base Bid.

9.5 Bidders to be considered responsive shall submit bids on all add alternates listed in the Bid Form. The low bidder will be determined by comparison of the Base Bid and any alternates selected by the Owner.

9.6 A Bid which includes for any item a Bid Price that is abnormally low or high may be rejected as unbalanced.

ARTICLE 10. SALES TAX

10.1 The goods and services to be provided under this Contract are exempt from the Sales and Use Taxes of the State of Massachusetts.

ARTICLE 11. COMMONWEALTH OF MASSACHUSETTS REQUIREMENTS

11.1 Applicable provisions of Massachusetts General Laws and Regulations and/or the United States Code and Code of Federal Regulations govern this Contract and any provision in violation of the foregoing shall be deemed null, void and of no effect. Where conflict between Code of Federal Regulations and State Laws and Regulations exist, the more stringent requirement shall apply. Note that the City of Taunton has special legislation for contracts associated with water and wastewater treatment facilities.

11.2 Minimum Wage Rates as determined by the Executive Office of Labor and Workforce Development under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract. Federal Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this project. See Appendix G to the Agreement.

11.3 The contractor guarantees that the Work and Services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction of the same shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Drawings, Specifications, and other contract documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted in accordance with that subsection of this AGREEMENT titled "Partial Acceptance", the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance.

If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the contractor in writing to make the required repairs, correction or replacements. If the Contractor neglects to commence making such repairs, corrections or replacements to the satisfaction of the Owner within seven (7) days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make said repairs, correction or replacements, and charge the costs, including compensation for additional professional services, to the Contractor."

11.4 This project is subject to the Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments, and to any applicable Massachusetts regulations. Contractors shall be familiar with the requirements of these regulations.

11.5 Whenever it is written that an equipment manufacturer must have a specified period of experience with his product, equipment which does not meet the specified experience period can be considered if the equipment supplier or manufacturer is willing to provide an "Efficiency Guarantee Bond" or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of failure.

11.6 This project is subject to the requirements of the Department of Environmental Protection's Diesel Retrofit Program. Bidders must submit a signed and dated Statement of Intent to Comply form as part of their bid proposal documents.

11.7.1 **The BABA requirements are waived for this Project** based on EPA's Decision Memorandum titled Adjustment Period Waiver of Section 70914(a) of P.L. 117-58, Build America, Buy America Act for SRF Projects that have Initiated Design Planning issued September 2, 2022

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

SECTION 00300

BID FORM

THIS BID IS SUBMITTED TO: Veolia Water North America - Northeast, LLC

PROJECT IDENTIFICATION: City of Taunton, MA
2023 Pump Station Improvements
Contract S-2023-2, CWSRF 7210

- A. The undersigned declares that the only persons or parties interested in this Bid as principals are as stated; that the Bid is made without any collusion with other persons, firms, or corporations; that all the Procurement Documents as prepared by Veolia Water North America - Northeast, LLC, 53 State Street, 14th Floor, Boston, MA, 02109 and dated DATE have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the work and the place where it is to be delivered, and from them the undersigned makes this Bid. These prices shall cover all expenses incurred in providing the Goods and Services required under the Procurement Documents, of which this Bid Form is a part.
- B. The time period for holding bids, where Federal approval is not required is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids and where Federal approval is required, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval.
- C. If unsigned copies of the Construction Agreement are delivered to the undersigned within sixty days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids, the undersigned will within three days, excluding Saturdays, Sundays, and legal holidays, after the date of receipt of such notification, execute and return all copies of the Construction Agreement to Veolia.
- D. The undersigned hereby agrees to fully complete the 2023 Pump Station Improvements in accordance with the terms stated in the Agreement.
- E. The undersigned acknowledges receipt of addenda:

Addendum No. _____, dated _____

Addendum No. _____, dated _____

Addendum No. _____, dated _____

- F. The Contract will be awarded to the lowest responsible and eligible Bidder (Successful Bidder). Such a Bidder shall possess the skill, ability, and integrity necessary for the faithful performance of the work. The term "lowest responsible and eligible Bidder" as used herein shall mean the Bidder whose Bid is the lowest of those Bidders possessing the skill, ability, and integrity necessary to the faithful performance of the Work.
- G. Veolia reserves the right to reject any and all Bids, to waive any and all informalities if it is in Veolia's best interest to do so, and the right to disregard all nonconforming, non-responsive or conditional Bids.
- H. The undersigned agrees that, if they are selected as Contractor, they will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the Company (Veolia), execute a contract in accordance with the terms of this bid and furnish a performance bond in the amount of 100% of the total contract price and also a labor and materials or payment bond in the amount of 100% of the total contract price, each of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Company and each in the sum of the contract price, the premiums for which are to be paid by the Contractor and are included in the contract price.
- I. The Subcontractor shall complete all work required under the Contract within 950 days of the issuance of a Notice to Proceed. Work performed beyond the completion date will be subjected to liquidated damages in the amount specified herein.
- J. Liquidated damages specified in this contract are \$1,000 per day for each calendar day beyond the contract completion date that work remains uncompleted.

- K. The time period for holding bids, where Federal approval is not required is 30 days, Saturdays, Sundays and legal holidays excluded, after the opening of bids and where Federal approval is required, the time period for holding bids is 30 days, Saturdays, Sundays and holidays excluded after Federal approval.
- L. All Bids for this project are subject to applicable bidding laws of Massachusetts, including General Laws Chapter 30, Section 39M (a) and (c) as amended.
- M. Pursuant to M.G.L.c.62C, s49A I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all State Taxes required under law.
- N. The undersigned bidder hereby certifies he/she will comply with the specific affirmative action steps contained in the EEO/AA provisions of this Contract, including compliance with the Disadvantaged Business Enterprise provisions as required under these contract provisions. The contractor receiving the award of the contract shall incorporate the EEO/AA provisions of this contract into all subcontracts and purchase orders so that such provisions will be binding upon each subcontractor or vendor.
- O. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-Nine F of Chapter Twenty-Nine, or any other applicable debarment provisions of any other Chapter of the General Laws or any rule or regulation promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.
- P. Bidders must fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled responsibilities of Participants Regarding transactions (Doing Business with Other Persons). Contractors, subcontractors, or suppliers that appear on the Excluded Parties List System at www.usgovxml.com/dataservice.aspx?ds=EPLS are not eligible for award of any contracts funded by the Massachusetts State Revolving Fund.
- Q. The Contractor agrees that it will fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons). The Contractor shall not award any subcontracts or purchase any materials from suppliers that appear on the Excluded Parties List System.
- R. The Contractor shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The Contractor shall maintain reasonable records to demonstrate compliance with these requirements
- S. Bidders must fully comply with the Diesel Retrofit Program. See Appendix B to the Agreement.
- T. In accordance with the above understanding, the undersigned proposes to furnish all Goods and Services, and complete the Work in its entirety in the manner and under the conditions required at the prices listed as follows:

BASE BID

<u>Item Number</u>	<u>Estimated Quantity</u>	<u>Brief Description: unit or lump-sum price bid in both words and figures.</u>	<u>Total in Figures</u>
1A	1 LS	Myles Standish Boulevard Wastewater Pumping Station Full Station Rehabilitation, per Lump Sum, _____dollars and _____cents (\$ _____) \$ _____	
1B	1 LS	Partridge Circle Wastewater Pumping Station Replacement of Submersible Pumps, per Lump Sum, _____dollars and _____cents (\$ _____) \$ _____	

1C	1 LS	Wellesley Circle Wastewater Pumping Station Replacement of Suction Lift Pumps, per Lump Sum, _____ dollars and _____ cents (\$ _____) \$ _____
1D	1 LS	School Street Wastewater Pumping Station Generator Replacement, per Lump Sum, _____ dollars and _____ cents (\$ _____) \$ _____
1E	1 LS	Stevens Street Wastewater Pumping Station Generator Replacement, per Lump Sum, _____ dollars and _____ cents (\$ _____) \$ _____
1F	1 LS	Davis Street Wastewater Pumping Station Converting Power from Single-Phase to 3-Phase, per Lump Sum, _____ dollars and _____ cents (\$ _____) \$ _____
1G	1 LS	Industrial Park Wastewater Pumping Station Generator Replacement, per Lump Sum, _____ dollars and _____ cents (\$ _____) \$ _____
2A	1 LS	Management of Soil/Fill and Contaminated Materials, per Lump Sum, _____ dollars and _____ cents (\$ _____) \$ _____
2B	500 TON	Remove & Dispose of Re-use Facility Soil , per ton, _____ dollars and _____ cents (\$ _____) \$ _____
2C	100 TON	Remove & Dispose of In-State Landfill Material, , per ton, _____ dollars and _____ cents (\$ _____) \$ _____

2D 100 Remove & Dispose of Out-of-State Landfill Material,
TON , per ton,

_____ dollars
and _____ cents (\$ _____) \$ _____

3 \$25,000 Utility Service Allowance,
Allowance , per Allowance,

_____ dollars
and _____ cents (\$ _____) \$ _____

TOTAL OF 2023 PUMP STATION IMPROVEMENTS BASE BID:

In Figures: \$ _____

In Words: _____

_____ **Dollars**

and _____ **Cents**

Amounts shall be shown in both words and figures, where indicated. In case of discrepancy, the amount shown in words will govern.

The above prices shall include all labor, materials, delivery, overhead, profit, insurance, and incidentals required to complete the Work.

- U. The names and residences of all persons and parties interested in the foregoing Bid as principals are as follows:

(Give first and last names in full.)

- V. Notice of acceptance should be e-mailed or delivered to the undersigned Bidder at the following address:

(Name of Bidder)

(Title)

(Business Address)

(City and State)

Date

Note: If the Bidder is a corporation, indicate State of incorporation under signature, and affix corporate seal; if a limited liability company, indicate State of formation under signature; if a partnership, give full names and residential addresses, if different from business address.

STATEMENT OF INTENT TO COMPLY

This form must be signed and submitted by the bidder as part of the bid.

Local Governmental Unit City of Taunton, MA *SRF Project No.* 7210

Contract No. S-2023-2 *Contact Title* 2023 Pump Station Improvements

Bidder

The undersigned, on behalf of the above-named Bidder, agrees that, if awarded the Contract:

- 1. the Bidder shall comply with the Department of Environmental Protection's ("DEP") Diesel Retrofit Program by ensuring that all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard;*
- 2. the Bidder shall require all Subcontractors to comply with MassDEP's Diesel Retrofit Program by ensuring all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard; and*
- 3. The Bidder shall submit and shall require each Subcontractor to submit a Diesel Retrofit Program Contractor Certification (form attached) with a Diesel Retrofit List to DEP (NAME and ADDRESS) and the Bidder within 10 days of the bidder being notified that it has been awarded the Contract. The Bidder shall require each Subcontractor to update such Certification and List within 2 days of using additional Diesel Construction Equipment on the project under the Contract.*

(Signature of Bidder's Authorized Representative)

(Date)

SECTION 00500

CONSTRUCTION AGREEMENT

Between

Veolia Water North America - Northeast, LLC

and

Subcontractor

Located in: Taunton, MA

Project: 2023 Pump Station Improvements

Contract S-2023-2, CWSRF 7210

Date:

CONSTRUCTION AGREEMENT

THIS CONSTRUCTION AGREEMENT ("Agreement") is made and entered into as of _____, 2023 ("Effective Date") by and between Veolia Water North America - Northeast, LLC, a Delaware corporation (hereinafter "Company") whose address is 53 State Street, 14th Floor, Boston, MA 02127, and Subcontractor (hereinafter "Subcontractor"), whose address is Street, City (Town), State ZIP, (each a "Party" and collectively the "Parties"),

WHEREAS, in consideration of the mutual promises herein contained, Company and Subcontractor agree, promise, and obligate themselves as follows:

1. Subcontractor promises to provide the services described in Exhibit A, Scope of Work, (hereinafter the "Work") in accordance with the Agreement. The Work is provided to support Company's obligations to Taunton, MA (hereinafter "Client") in conjunction with Company's performance at the City of Taunton 2023 Pump Station Improvements (hereinafter the "Project") and its agreement with the Client (the "Prime Contract").
2. Company promises to pay Subcontractor for full, accurate, and timely performance of the Work and compensation as provided in Exhibit C and as set forth below in the Contract Documents.
3. This Agreement constitutes the entire understanding between the Parties, and cancels and supersedes all prior negotiations, representations, understandings and agreements, except that the indemnification obligations contained in any prior agreements shall survive the execution of this Agreement and consists of a) this Agreement; and b) its Exhibits (collectively referred to as "Contract Documents") incorporated and referenced as follows:
 - Notice of Award
 - Addenda _____ to _____
 - Bid Form
 - Exhibit A - Scope of Work (Note: Drawings and Specifications have been provided by Company and are not attached to this Agreement.)
 - Exhibit B - General Terms and Conditions
 - Exhibit C - Compensation
 - Exhibit C.1 - Interim Waiver and Release of Liens and Claims upon Payment
 - Exhibit C.2 - Unconditional Final Waiver and Release of Liens
 - Exhibit D - Insurance Requirements
 - Exhibit E - Insurance Supplement
 - Exhibit F - Additional / Special Terms - Illustrative Schedule
 - Exhibit G - Terms and Conditions for Hazardous or Contaminated Non-Hazardous Waste
 - Exhibit H - IT Security Requirements
 - Exhibit I - Anti-Corruption Compliance
 - Exhibit J - Bonding / Letters of Credit requirements

In the event of an inconsistency between provisions of the Agreement, the inconsistency shall be resolved by giving precedence as follows: 1) this Agreement, 2) Exhibit F Additional/Special Terms, 3) Exhibit B General Terms and Conditions, 4) Exhibit A Scope of Work, and 5) any remaining Contract Documents.

4. The Effective Date set forth above is the date as to which all Contract Documents have reference for purposes of coordination of their meaning and effect. Any work commenced and any payments made pursuant to an award or letter of intent prior to the execution date hereof shall be deemed to have been done and paid after the Effective Date and governed by the terms of this Agreement.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be signed by their respective authorized representatives, effective as of the date indicated above.

Veolia Water North America - Northeast, LLC:	Subcontractor:
By:	By:
Title:	Title:
Typed Name:	Typed Name:
Date:	Date:

EXHIBIT A
SCOPE OF WORK

1 DESCRIPTION

Except as otherwise expressly provided herein, Subcontractor shall provide all labor, supervision, material, supplies, equipment, inspections, and any other incidentals required to perform the Work as described in this Scope of Work for the Project. The Work is defined on Contract plans and specifications entitled "2023 Pump Station Improvements, Contract No. S-2023-2, CWSRF 7210, Prepared by BETA Group, Inc." and generally described as improvements to wastewater pumping stations at multiple locations.

2 PERFORMANCE PERIOD / SCHEDULE

Time is of the essence in the performance of this Work. Subcontractor shall make whatever adjustments in working hours, manpower, equipment, etc. deemed necessary to complete the Work in accordance with the terms of the Agreement and the specific schedule requirements hereof.

The Time for Completion of this Agreement is 950 calendar days. The Subcontractor shall prepare a Project schedule.

Liquidated damages specified in this contract are \$1,000 per day for each calendar day beyond the contract completion date that work remains uncompleted.

3 REPORTING REQUIREMENTS

The Subcontractor shall prepare daily reports and a monthly progress report providing significant progress completed that month summarized in bullet points and also providing percent of project complete.

4 DATA REQUIREMENTS

INTENTIONALLY LEFT BLANK

5 SPECIAL EQUIPMENT WARRANTIES

Subcontractor warrants that the goods and equipment ("Equipment") shall be free from liens and defects in title, design, material, workmanship, and performance, and shall conform and perform in all respects to the terms of this Order, the specifications and applicable drawings and shall be new and of the best quality. If, any time prior to the earlier of one (1) year from the date of actual productive use of the Equipment or from completion of performance of the services, it appears the Equipment or services do not conform to these warranties or the specifications, and Company so notifies the Subcontractor, Subcontractor shall promptly correct such nonconformity and take all other action to remedy the results of any defect or nonconformity to the satisfaction of the Company, at Subcontractor's sole expense, failing which Company may reject or revoke acceptance and cover, or Company may perform Subcontractor's work and correct such defects at Subcontractor's expense. These rights shall survive acceptance and the warranty shall inure to the benefit of and be enforceable by Company and its customer.

6 COMPANY FURNISHED ITEMS

With respect to the Company Furnished Products identified below, Subcontractor shall fulfill the described responsibilities:

Subcontractor's Responsibilities:

Review Company provided shop drawings.
Inspect for completeness or damage, jointly with Company.
Handle, store, install and finish products.

Repair or replace products/items damaged after receipt.
Arrange for manufacturer's inspections, service, start-up services and training.

7 WORKING HOURS

The Work to be performed is located at multiple wastewater pumping station locations, Taunton, MA ("Project Site") and the working hours are 7:00 A.M. to 3:30 P.M. Monday through Friday. Subcontractor shall coordinate with designated Veolia staff for deviations to this requirement.

8 COMMONWEALTH OF MASSACHUSETTS PROVISIONS

- A. Note that the City of Taunton has special legislation for contracts associated with water treatment facilities. This legislation amends the MGL.
- B. The Contractor agrees that it will fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons). The Contractor shall not award any subcontracts or purchase any materials from suppliers that appear on the Excluded Parties List System. The Contractor shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The Contractor shall maintain reasonable records to demonstrate compliance with these requirements.
- C. The fair share goals for disadvantaged business enterprise (DBE) participation for this contract are a minimum of 6.7 percent Disadvantaged Minority Business Enterprise (D/MBE) participation and 7.2 percent Disadvantaged Women Business Enterprise (D/WBE) participation, applicable to the total dollar amount paid for the construction contract. The Contractor shall take all affirmative steps necessary to achieve this goal, and shall provide reports documenting the portion of contract and subcontract dollars paid to DBEs, and its efforts to achieve the goals, with each invoice submitted or at such greater intervals as specified by the (municipality). The contractor shall require similar reports from its subcontractors.
- D. During the performance of this contract, the contractor agrees as follows:
 - a. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, 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 by the contracting officer setting forth the provisions of this nondiscrimination clause.
 - b. The contractor will, in all solicitations or advancements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.
 - c. 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 by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
 - d. The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
 - e. The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders. Comp., p. 684, EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230

- f. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept. 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- g. The contractor will include the provisions of paragraphs (1) through (7) 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 No. 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 may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States." [Sec. 202 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966-1970
- E. The contractor shall not participate in or cooperate with an international boycott, as defined in Section 999 (b)(3) and (4) of the Internal Revenue code 1986, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws.
- F. Pursuant to M.G.L. c.44, s31C, I certify that an appropriation has been made in the total amount of the contract.
- G. This project is subject to the American Iron and Steel and the Build America, Buy America Act (BABA). The amendments to the Clean Water Act, as part of WRRDA, apply the American Iron and Steel (AIS) requirements to all treatment work projects. Furthermore, BIL extends this procurement requirement to all SRF construction projects going forward with the inclusion of the Build America, Buy America Act (BABA). Starting on May 14, 2022, all steel, iron, manufactured products, non-ferrous metals, plastic and polymer-based products (including polyvinylchloride, composite building materials and polymers used in fiber optic cables), glass (including optic glass), lumber, and drywall used in infrastructure projects for federal financial assistance programs must be produced in the United States. MassDEP ensures that the required procurement language is included in contracts and conducts field verifications of project compliance.

The BABA requirements are waived for this Project based on EPA's Decision Memorandum titled Adjustment Period Waiver of Section 70914(a) of P.L. 117-58, Build America, Buy America Act for SRF Projects that have Initiated Design Planning issued September 2, 2022.

The Contractor acknowledges to and for the benefit of the City of Taunton and the Commonwealth of Massachusetts (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.

- H. All construction contracts are subject to the Davis Bacon wage rate requirements and must include the provisions found in Appendix G in the contract. The Davis Bacon Act Requirements are included.
- I. The Contractor agrees that it will fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons). The Contractor shall not award any subcontracts or purchase any materials from suppliers that appear on the Excluded Parties List System. The Contractor shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The Contractor shall maintain reasonable records to demonstrate compliance with these requirements.
- J. M.G.L statutes:

- M.G.L c.30 s 39F Payment to Subcontractor
- c.30 s 39I Deviation from Plans and Specifications
- c.30 s 39J No Arbitrary Decisions are Final
- c.30 s 39L Construction Work by Foreign Corporations
- c.30 s 39N Differing Site Conditions
- c.30 s 39O Equitable Adjustments for Delays
- c.30 s 39P Decision on Interpretation of Specifications
- c.30 s 39R Contractor's Records
- c.149 s 34 Limitations on Hours of Work
- c.82 s 40 Excavations; Notice; Penalties

Section 39F.

- a. Every contract awarded pursuant to sections forty-four A to L, inclusive, of chapter one hundred and forty-nine shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M of chapter thirty shall contain the following subparagraphs (a) through (h) and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.
 - a. Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.
 - b. Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.
 - c. Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.
 - d. If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the

balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

- e. Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.
- f. The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.
- g. All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.
- h. The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.
- i. If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor

or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g) and (h).

- b. Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.
- c. "Subcontractor" as used in this section (i) for contracts awarded as provided in sections forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (a) of section thirty-nine M of chapter thirty shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall also mean a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.
- d. A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the awarding authority and the general contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. Sections fifty-nine and fifty-nine B of chapter two hundred thirty-one shall apply to such petitions. The court shall enter all interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections fifty-nine and fifty-nine B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal there from as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest carried for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the awarding authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the awarding authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1).
- e. In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any

deposit of a disputed amount by the awarding authority as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1) any amount held under a trustee writ or pursuant to a restraining order or injunction.

Section 39N. Every contract subject to section forty-four A of the chapter one hundred and forty-nine or subject to section thirty-nine M chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning, the filing investigation and settlement of such claims if, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

- a. The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.
 - b. The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.
- K. Monthly price adjustments will be made for qualifying work orders using Diesel Fuel, Gasoline, Asphalt, Concrete, and Steel in accordance with the Specifications.
- a. Any adjustment will be based on the Period Price as published by MassDOT at the time of the Bid.
 - b. Adjustment will only be made if the variance from the Base Price is 5% or more for a monthly period.

L. Appendices (Refer to Specification Section 01067):

1. Appendix A1 - Certification Statement
2. Appendix B - Diesel Retrofit Program
3. Appendix E - Disadvantaged Business Enterprises
4. Appendix F - DIVISION OF MUNICIPAL SERVICES POLICIES
5. Appendix G - Davis Bacon Act Requirements
6. Appendix H – Price Adjustment for Certain Materials
7. Appendix I – American Iron and Steel Requirements
8. Appendix J – Signage Requirements

9 GENERAL REQUIREMENTS

- A. Work is defined on Contract plans and specifications entitled “2023 Pump Station Improvements, Contract No. S-2023-2, CWSRF 7210, Prepared by BETA Group, Inc.” and includes, but is not limited to:
- Myles Standish Boulevard Wastewater Pumping Station
 - Full pumping station rehabilitation including, but not limited to, new submersible pumps, piping, electrical and instrumentation associated with a new dry pit / wet pit wastewater pumping station
 - Partridge Circle Wastewater Pumping Station
 - Replacement of existing submersible pump and installation of new pump guide rails
 - Wellesley Circle Wastewater Pumping Station
 - Replacement of existing suction lift pumps
 - School Street Wastewater Pumping Station
 - Replacement of existing generator
 - Stevens Street Wastewater Pumping Station
 - Replacement of existing generator
 - Davis Street Wastewater Pumping Station
 - Convert existing power (Single Phase to 3-Phase)
 - Industrial Park Wastewater Pumping Station
 - Replacement of existing generator
 - Startup of new equipment, demonstration of control strategies, and activation of new pumping stations
 - Electrical work as shown in the contract documents - Electrical drawings and Specifications Division 16
 - Install instrumentation and control panels furnished under Division 13 and Division 11

 - Safety Requirements:
 - The Subcontractor is to meet and review the Veolia safety plan for this facility prior to initiating work and shall submit a site-specific safety plan. The minimum PPE requirements are Steel toed boots, ANSI approved hard hats, and ANSI approved safety glasses.
 - Certain tasks may require additional personnel protective equipment - such as a respirator, hearing protection, fall protection, tyvek suits. Prior to performing these tasks - a job site safety analysis must be facilitated.

DIESEL RETROFIT PROGRAM CONTRACTOR CERTIFICATION

Each Contractor and its Subcontractor(s) must sign and email this form to the DEP DMS project engineer, within 10 days after the contractor is awarded.

Local Governmental Unit: City of Taunton SRF Project No.: 7210

Contract No.: S-2023-2 Contact Title: 2023 Pump Station Improvements

Contractor: _____

I, _____, an authorized signatory for
(Authorized Representative)

(Contractor)

whose principal place of business is at _____ do hereby certify that any and all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract (hereinafter "Diesel Construction Equipment") have pollution control devices, such as oxidation catalysts or particulate filters, installed on the exhaust system side of the diesel combustion engine equipment in accordance with the Diesel Retrofit Program Standard.

I am submitting on behalf of _____ a list of all said Diesel Construction
(Contractor)
Equipment, labeled "Diesel Retrofit List," that will be used in connection with this Contract by

_____. I hereby certify that the information on the attached Diesel Retrofit List is correct and accurate as of the date of signature. The List includes the following information for each piece of Diesel Construction Equipment:

1. Equipment type, make, model;
2. Vehicle Identification Number or VIN;
3. Engine model and year of manufacture;
4. Engine HP rating;
5. Emission Control Device ("ECD") type (Diesel Oxidation Catalyst or Diesel Particulate Filter);
6. ECD make, model, and manufacturer;
7. ECD EPA or CARB Verification Number or manufacturer's certification that the DOC or DPF meets or exceeds emission reductions provided by similar emission control technology verified by EPA or CARB;
8. ECD installation date;
9. Type of fuel to be used; and
10. Whether the equipment is owned or rented.

Contractor shall notify DEP within 48 hours of any new Diesel Construction Equipment brought onto the Contract site. Contractor shall maintain detailed records of all Diesel Construction Equipment used at the Contract site, including the dates and duration times the Diesel Construction Equipment is used at the Contract site. Contractor shall make such records available for inspection by DEP. Contractor shall ensure that the emissions control technology for each piece of Diesel Construction Equipment is operated, maintained, and serviced as recommended by the manufacturer. Contractor shall retrofit prior to the end of the Contract any Diesel Construction Equipment no longer exempt from meeting the Diesel Construction Equipment Standard under exemption 3 (because it had an engine that met the EPA particulate matter (PM) Tier emission standards currently in effect at the start of the Contract for non-road diesel engines for the applicable engine power group and such emissions standards were superseded during the Contract).

I acknowledge that this certificate is being furnished as a requirement under this Contract and is subject to applicable State and federal laws, both criminal and civil. Signed under pains and penalty of perjury on

this date _____.

Signature: _____

Printed Name: _____

Title: _____

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF MUNICIPAL SERVICES

THE REVOLVING FUND LOAN PROGRAM – SCHEDULE OF SUBCONTRACTOR PARTICIPATION

Unit _____
Number _____

Environmental Protection Agency (EPA) requires that all SRF borrowers develop and maintain a list of all MBE/WBE and non MBE/WBE subcontractors on the project. Completed and returned to MassDEP within 90 days of award of the contract.

Point of Contact Mailing Address Telephone Number E-Mail Address MBE WBE DBE Subcontract Value

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
 MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
 DIVISION OF MUNICIPAL SERVICES

SCHEDULE OF PARTICIPATION FOR SRF CONSTRUCTION

Project Title: _____ **Project Location:** _____

Disadvantaged Minority Business Enterprise Participation in the SRF Loan Work

	Name & Address of D/MBE	Nature of Participation	Dollar Value of Participation
1.			
2.			
3.			
Total D/MBE Commitment:			
= (Total D/MBE Commitment) / (Bid Price)			%

Disadvantaged Women Business Enterprise Participation in the SRF Loan Work

	Name & Address of D/WBE	Nature of Participation	Dollar Value of Participation
1.			
2.			
3.			
Total D/WBE Commitment:			
= (Total D/WBE Commitment) / (Bid Price)			%

The Bidder agrees to furnish implementation reports as required by MassDEP to indicate the D/MBEs and D/WBE(s) which it has used or intends to use. Breach of this commitment constitutes a breach of the contract.

Name of Bidder: _____

Date: _____ By: _____
Signature

NOTE: Participation of a DBE may be counted in only their certified category; the same dollar participation cannot be used in computing the percentage of D/MBE participation and again of D/WBE participation.

LETTER OF INTENT FOR SRF CONSTRUCTION

This form is to be completed by the D/MBE and D/WBE and must be submitted by the Bidder no later than close of business on the third business day after notification by the LGU. A separate form must be completed for each D/MBE and D/WBE involved in the project.

Project Title: _____ Project Location: _____

TO: _____
(Name of Bidder)

FROM: _____
(Please Indicate Status D/MBE or D/WBE)

° I/we intend to perform work in connection with the above project as (check one):

- | | |
|---|--|
| <input type="checkbox"/> An individual | <input type="checkbox"/> A partnership |
| <input type="checkbox"/> A corporation | <input type="checkbox"/> A joint venture with: _____ |
| <input type="checkbox"/> Other (explain): _____ | |

° It is understood that if you are awarded the contract, you intend to enter into an agreement to perform the activity described below for the prices indicated.

DBE PARTICIPATION

Description of Activity	Date of Project Commencement	\$ Amount	% Bid Price
		\$	%

° The undersigned certify that they will enter into a formal agreement upon execution of the contract for the above referenced project.

BIDDER

DBE

(Authorized Original Signature) _____ Date _____

(Authorized Original Signature) _____ Date _____

ADDRESS: _____
TELEPHONE #: _____
FEIN: _____
EMAIL ADDRESS: _____

ADDRESS: _____
TELEPHONE #: _____
FEIN: _____
EMAIL ADDRESS: _____

ORIGINALS:

- ° Compliance Mgr. City/Town Project Location
- ° DEP Program Manager for DEP's AAO Director

* Attach a copy of current (within 2 years) DBE Certification

DBE CERTIFICATION OF UNITED STATES CITIZENSHIP

For the SRF program, under the EPA Disadvantage Business Enterprise (DBE) Rule, a DBE must be owned or controlled by a socially and economically disadvantaged person that is also a citizen of the United States (See 40 CFR 33.202). "Ownership" is defined at 13 CFR 124.105 and "control" is defined at 13 CFR 124.106. DBEs are certified for the SRF program through the Supplier Diversity Office using the federal Department of Transportation (DOT) DBE rules. EPA allows the use of DBEs certified under the DOT rules as long as they are also United States citizens. To ensure compliance with the EPA rule, MassDEP must verify United States citizenship through the completion of the following form for each DBE used on the project.

SRF Project Number _____

Contract Number _____

Contract Title _____

DBE Subcontractor _____

The undersigned, on behalf of the above named DBE subcontractor, hereby certifies that the DBE firm is either owned or controlled by a person or persons that are citizens of the United States.

Printed Name and Title of DBE Signatory

DBE Signature

Date

**DISADVANTAGED BUSINESS ENTERPRISE
PROGRAM DBE SUBCONTRACTOR PARTICIPATION
FORM**

The United States Environmental Protection Agency (EPA) requires that this form be provided to all subcontractors on the project. At the option of the subcontractor, this form may be filled out and submitted directly to the EPA DBE Coordinator.

NAME OF SUBCONTRACTOR

PROJECT NAME

ADDRESS

CONTRACT NO.

TELEPHONE NO.

E-MAIL ADDRESS

PRIME CONTRACTOR NAME:

Please use the space below to report any concerns regarding the above EPA-funded project (e.g., reason for termination by prime contractor, late payment, etc.).

CONTRACT ITEM NO.	ITEM OF WORK OR DESCRIPTION OF SERVICES RECEIVED FROM THE PRIME CONTRACTOR	AMOUNT SUBCONTRACTOR WAS PAID BY PRIME CONTRACTOR
----------------------	---	--

Subcontractor Signature

Title/Date

Upon exhausting all known sources and making every possible effort to meet the minimum requirements for DBE participation, the Bidder may seek relief either partially or entirely from these requirements by submitting a completed waiver package by the close of business on the third business day after notification by the LGU. Failure to comply with this process shall be cause to reject the bid thereby rendering the Bidder not eligible for award of the contract.

General Information

Project Title: _____ Project Location: _____
Bid Opening (time/date) _____
Bidder: _____
Mailing Address: _____
Contact Person: _____ Telephone No. _____

Minimum Requirements

The bidder must demonstrate that good faith efforts were undertaken to comply with the percentage goals as specified. The firm seeking relief must show that such efforts were taken appropriately in advance of the time set for opening bid proposals to allow adequate time for response(s) by submitting the following:

- A. A detailed record of the effort made to contact and negotiate with disadvantaged minority and/or woman owned businesses, including:
 - 1. names, addresses, telephone numbers and contact dates of all such companies contacted;
 - 2. copies of written notice(s) which were sent to DBE potential subcontractors prior to bid opening;
 - 3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and
 - 4. in the case(s) where a negotiated price could not be reached the bidder should detail what efforts were made to reach an agreement on a competitive price.
 - 5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/women-focused media detailing the opportunities for participation;

- B. MassDEP may require the bidder to produce such additional information as it deems appropriate.
- C. No later than fifteen (15) days after submission of all required information and documentation, MassDEP shall make a determination, in writing, whether the waiver request is granted and shall provide that determination to the bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing.

CERTIFICATION

The undersigned herewith certifies that the above information and appropriate attachments are true and accurate to the best of my knowledge and that I have been authorized to act on behalf of the bidder in this matter.

(authorized original signature)

DATE

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER RESOURCES
DIVISION OF MUNICIPAL SERVICES POLICIES

The Division of Municipal Services (DMS) has established the following policies for all Division financially-assisted projects.

POLICY MEMORANDUM NO. PM-1

EASEMENTS AND RIGHTS OF WAY

Prior to the approval of financial assistance for construction, the owner shall obtain and shall thereafter retain, a fee simple or such estate or interest in the site of construction and rights of access as will assure undisturbed use and possession for the purpose of construction and operation for the estimated life of the project. The Division may refuse to approve financial assistance until it has received from the owner sufficient assurances that such interests have been obtained. Unless the Division otherwise notifies the owner, the certificate (under pains and penalties of perjury) of the owner's legal representative shall constitute such sufficient assurance.

Additional cost which result from interruptions of construction or extensions of contract time caused by the owner's failure to obtain the necessary interests in land shall be ineligible for financial assistance, and all such additional costs shall be borne by the owner.

POLICY MEMORANDUM NO. PM-2

PERMITS

The owner shall be responsible for identifying and obtaining all federal, state, local and railroad permits required by the nature and location of construction, including but not limited to building construction permits and permits for street and highway cuts and openings, and all such permits shall be listed in a separate permits section of the contract documents. To the extent possible, such permits shall be obtained by the owner prior to the solicitation of bids for construction, and copies of all permits so obtained shall be included in the said permits section. The status of the application for each permit, including the permit conditions, and costs, not obtained prior to the solicitation of bids shall also be indicated in the contract documents permits section. The Division may refuse to approve financial assistance for construction unless and until it has received from the owner sufficient assurances that all necessary permits have been or will be obtained prior to the commencement of construction.

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DEP-DMS-F Page 1 of 24

pspkg 2020-03-09

Policy Memorandum No. PM-2 – Permits (Con't)

The contractor shall be responsible for obtaining all permits required of his equipment, work force, or particular operations (such as blasting) in the performance of the contract and not otherwise specified in the two preceding paragraphs as to be obtained by the owner. These permit fees shall be paid by the contractor.

The owner shall be responsible for the payment of all other permit fees required by the construction.

The following permits shall not be eligible for financial participation by the Department of Environmental Protection (DEP).

- Permits and insurance for construction in railroads' rights of way;
- Building permits;
- Permits for opening public streets and other public or municipal rights of way;
- Permits for the use of explosives;
- Permits for the disposal of waste materials;
- Permits and fees for connecting to municipal utilities.

Permits required by extraordinary circumstances and not specifically excluded from eligibility above may be eligible for DEP participation. For such permits to be so eligible, the owner or his representative must notify the DEP project engineer in advance of obtaining such permit and receive from the engineer specific agreement that such permit will be eligible for DEP participation. Eligibility for such participation will not be made retroactively.

Additional costs which result from interruptions of construction or extensions of contract time resulting from the owner's or the contractor's failure to obtain the necessary permits may be ineligible for participation.

POLICY MEMORANDUM NO. PM-3

FIELD CONTROLS

The Owner shall be responsible for indicating on the contract drawings all easement limits and all property and other control lines for locating the principal component parts of the work together with those elevations and bench marks used in the design of the work, all hereinafter referred to as "field controls". Where easement and property limits have not previously been established in the field, the owner shall be responsible for establishment of such limits. From the information provided by the Owner, unless otherwise specified, the Contractor shall develop and make all layouts required for construction, such as slope stakes, batter boards, stakes for pipe locations and other working points, lines, elevations and cut sheets.

Whenever he has reason to believe that an error exists or whenever he is otherwise unable to locate the field controls, the contractor shall promptly notify the owner and the owner's engineer of such error with appropriate documentation.

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POLICY MEMORANDUM NO. PM-4**RECORD DRAWINGS**

The Owner shall be responsible for the preparation of all record drawings required by this contract. This responsibility may be delegated to the Owner's representative. The responsibility for preparation of record drawings shall not be delegated or transferred to the contractor. They may use the contractor's and sub-contractor's certified AS BUILT drawings along with their own marked up set in the preparation of the Record Drawings.

Division approved contract drawings shall be revised upon completion of the contract to reflect any changes made and/or final quantities, as appropriate.

POLICY MEMORANDUM NO. PM-5**PLAN SCALE**

Unless otherwise approved in advance by the Division, the horizontal scale for construction plans for non-structural facilities shall be 1" = 40'. A larger horizontal scale shall be used where appropriate to show sufficient detail to construct the project. The vertical scale for construction plans for non-structural facilities shall be 1" = 4'. Based on the best information available at the time of their preparation, the location of underground utilities and support structures for overhead utilities shall be shown on the plans.

Unless otherwise exempted in advance by the Division, construction plans shall be updated whenever the date of the advertisement for bids for the construction of such facilities is more than one year after the date of approval by the Division or EPA; and in the case of approval by both such agencies, the later approval date shall be used in determining the need for update.

The consulting engineer shall receive adequate compensation for updating plans and specifications, and such additional cost shall be eligible for assistance to the extent not otherwise prohibited by USEPA and Division regulations and program guidance.

All revision, or review without need for revision, shall be noted and dated on the plans prior to advertisement of the project for bid.

POLICY MEMORANDUM NO. PM-6**BORINGS LOGS**

All soil borings shall be taken as close as practicable to the construction line, and the location of all such borings shall be clearly indicated on the contract drawings. The plan view shall show the location and boring number of each boring. The profile view shall show the location, elevation, and depth of each soil boring, the location of each change in soil stratum, the groundwater level, and the average of blow counts at each five foot interval. As a minimum, boring logs to be submitted with the plans and specifications shall show the name of the company taking the borings, the soil classification, the number of blows per foot of penetration, the groundwater elevation, and the date on which the borings were taken.

As part of the submission of plans and specification for approval, the owner's representative shall include written justification for the lesser frequency and depth of borings where their interval is more than approximately 300' or their depth is less than 50% below depth of pipe invert.

POLICY MEMORANDUM NO. PM-7

BREAKDOWN OF BID ITEMS

The following items shall, where applicable, be listed separately in the bid documents.

- 1. Mobilization
- 2. Pavement
 - a. Municipal
 - i. temporary
 - ii. permanent
 - b. State
 - i. temporary
 - ii. permanent
- 3. Concrete cradle or encasement
(to be identified where applicable)
- 4. Rock-Excavation
- 5. Wood or steel sheeting left in place
- 6. Excavation of unsuitable materials below grade.
- 7. Select and/or borrow material
- 8. Dewatering
- 9. Special Dewatering (coffer dam)

Mobilization costs are the costs of initiating the contract, exclusive of the cost of materials. Payment for mobilization shall be a lump sum at the price bid for this item in the proposal and shall be payable when the contractor is operational on the site. For purposes of this policy, “operational” shall mean the substantial commencement of work on site.

The lump sum price bid for mobilization shall not exceed five per centum (5%) of the total amount of the bid.

POLICY MEMORANDUM NO. PM-8

PAVEMENT

All roads and trenches therein shall be refilled and repaved in accordance with specifications provided by the owner in the contract documents. Please note that this policy may be excludable on federally assisted projects where bid alternative items may be required (i.e. trench width vs. full width pavement). You are advised to seek project specific clarification.

Loan eligibility shall be limited to the following:

- A. Where the depth of the pipe invert is 0 to 8’, the maximum pavement widths which shall be eligible for financial assistance are as follows:

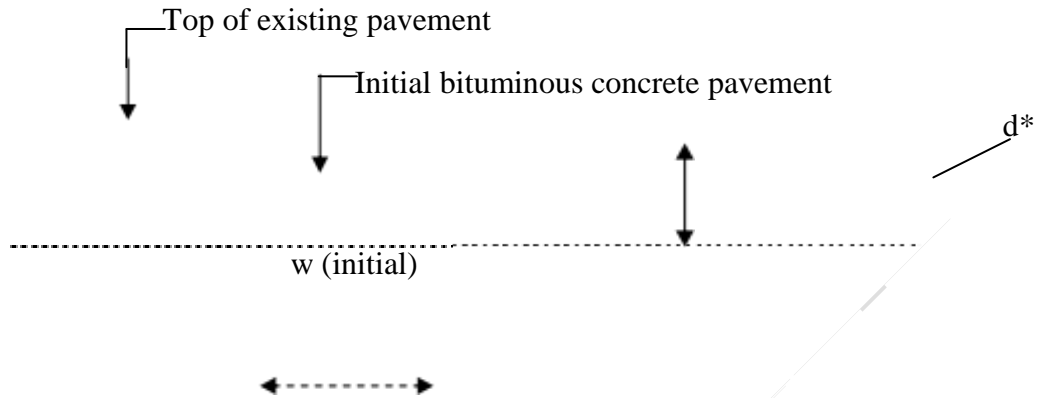
<u>Nominal Pipe Diameter</u>	<u>Maximum Eligible Widths</u>	
	<u>Initial Pavement</u>	<u>Permanent Trench</u>
0-24”	6’-6”	8’-6”

Where the nominal pipe diameter is greater than 24” the maximum eligible width for initial re-paving shall be the nominal diameter of the pipe plus four (4) feet, and for permanent trench re-paving the maximum eligible width shall be the nominal pipe diameter plus six (6) feet.

- B. For each additional four (4) feet (or fraction thereof) of pipe invert depth, add three feet to the eligible width limits stated in paragraph A.

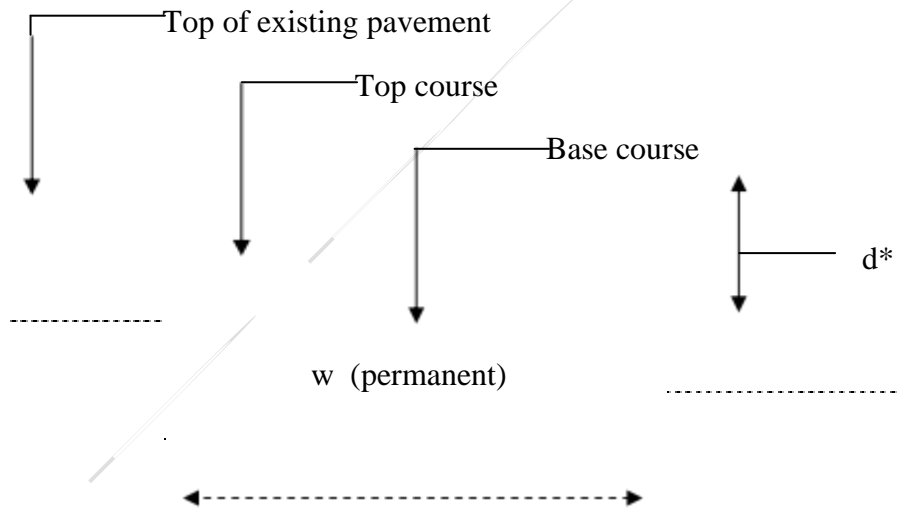
At the design phase of a project the owner has the option to elect either Initial Pavement with Option I (Permanent Trench replacement) or Initial with Option II (curb to curb over initial)

Initial Pavement



d* = depth of existing pavement to a maximum of 3 inches (see general notes #3)
w = maximum eligible Initial pavement width as described in paragraphs “A” & “B” on page DEP-DMS-CG’s-P4.

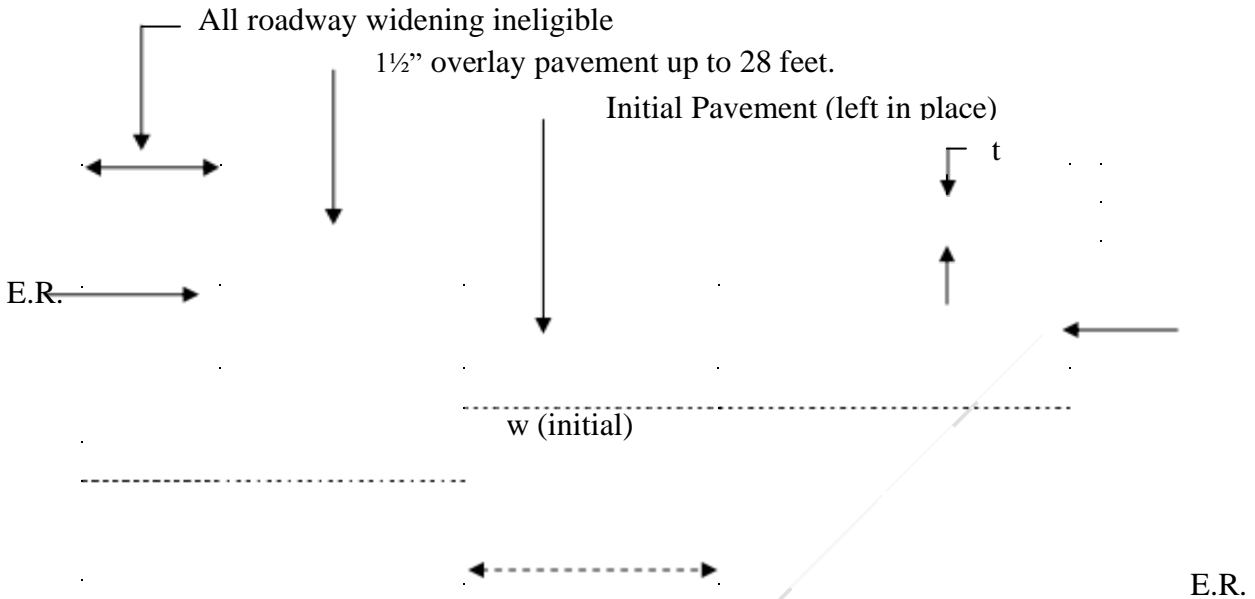
OPTION I Permanent Trench Pavement



d* = depth of existing pavement trench to a maximum of 3 inches (see general notes #3)
w = maximum eligible permanent pavement width as described in paragraphs “A” & “B”.
equals initial width plus 2 feet and includes:

- Cutting edges for the permanent trench
- Removal of initial patch plus two feet of existing pavement
- Fine grading/compacting gravel
- Placement of Permanent Trench pavement in two courses.

OPTION II Curb to Curb Pavement (overlay pavement for roadways up to 28 feet)



E.R.= edge of existing paved roadway

t = one and one half inch (1 1/2") overlay of bituminous concrete pavement

GENERAL NOTES:

1. Repavement of settled areas and crown restoration within the trench limits shall be the responsibility of the contractor.
2. Leveling outside the trench limits shall be the responsibility of the owner.
3. Sewer trench re-fill and pavement re-paving on public ways under the jurisdiction of the Massachusetts Department of Public Works, the Metropolitan District Commission, or other such agency shall be in accordance with permit(s) issued therefore by that Department or Commission, as the case may be.
4. The Division will consider requests for increase in the participating pay limits defined in paragraphs A and B, when such increases are, in the Division's opinion, reasonable. Such requests should be documented in writing and submitted to the Division in a timely manner.
5. Projects which deviate from the above options are required to seek Division review and approval.

POLICY MEMORANDUM NO. PM-9 PIPE TESTING

Monthly payment estimates shall be prepared in accordance with contract documents. All pipe shall be tested in accordance with the contract documents and sound engineering practice. If, after 60 days following submission of a monthly payment estimate for pipe items, the pipe for which payment is requested has not been successfully tested, the owner may withhold up to 10% of the amount requested for such pipe items until the pipe has been so tested. However, in the case of a major (pipe diameter 24 inches or greater) interceptor pipe installation, sums retained by the owner pursuant to this policy memorandum shall not exceed two per centum (2%) of the costs of such pipe items.

POLICY MEMORANDUM NO. PM-10

CHANGE ORDERS

Executed change orders submitted to the Division for review and processing for financial assistance must be prepared on the attached Change Order Forms (PM-10, Attachment 1, pages A-1 & A-2) with a duplicate copy, calculation sheet(s) (PM-10, Attachment 2), and all other supporting documentation necessary for evaluation. Failure to comply with these instructions will result in delays in processing the change order and/or limited financial assistance.

M.G.L. c.44, s.31C requires that the auditor, accountant, or other municipal officer having similar duties must certify that adequate funding in an amount sufficient to cover the total cost of the change order has been made. Change orders will not be processed or approved until this certification is made on the face of the Change Order Form (PM-10 Attachment 1).

Payment of Change Orders:

Payment of all change orders shall be in accordance with the relevant provisions of Massachusetts General laws, Chapter 30, Section 39G for non-building construction and Section 39K for building construction.

Payment of change orders shall be made in accordance with one of the following three methods:

- A. Existing unit prices as set forth in the contract; or
- B. Agreed upon lump sum or unit prices; or
- C. Time and materials

A. **Payment for work for which there is a unit price in the contract:**

Where the contract contains a unit price for work and the Engineer orders a change for work of the same kind as other work contained in the contract and is performed under similar physical conditions, the contractor may accept full and final payment at the contract unit price(s) for the acceptable quantities.

B. Payment for work or materials for which no price is contained in the contract:

If the Engineer directs, the contractor shall submit promptly in writing to the Engineer and offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. The stated price, either lump sum or unit price, shall be divided so as to show that it is the sum of:

- (1) The estimated cost of labor, plus
- (2) Direct Labor Cost, plus
- (3) Material and Freight Costs, plus
- (4) Equipment Costs, plus
- (5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
- (6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
- (7) Credits for work deleted from the contract.

C. Payment for work on a time and materials basis:

Unless an agreed lump sum and/or unit price is obtained from above and is so stated in the change price, the contractor shall accept as full payment for which no other agreement is contained in contract, and amount equal to:

- (1) The estimated cost of Labor, plus
- (2) Direct Labor Cost, plus
- (3) Material and Freight Costs, plus
- (4) Equipment Costs, plus
- (5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
- (6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
- (7) Credits for work deleted from the contract.

Explanation of items (1) through (7) as outlined in “B” and “C”:

- (1) Labor – Only those workers employed on the project who are doing the extra work, including the foreman in charge, are allowable. General foremen, superintendents, or other supervisory personnel are considered to be included in the overhead markup as provided in items (5) and/or (6). Hourly labor rates in excess of those as listed in the contract wage rates (Federal or State, whichever applies) require documentation. As a minimum, an explanation and the appropriate copy of the certified payroll are required.

Policy Memorandum No. PM-10 – Change Orders (Con't)

(4) Equipment – Only the equipment required as a result of the change order is allowable. Equipment rental rates shall be governed by the current Nielson/Dataquest Rental Rate bluebook for Construction Equipment (the “Bluebook”). In determining the rental rate the following shall apply:

- (a) For equipment already on the project – the monthly prorated rental rate by the hourly use shall be applicable;
- (b) For equipment not on the project the daily rate, the weekly rate, or monthly rate will prevail, whichever will prove to be most cost effective. Small tools and manual equipment are examples of costs not allowable under this item. These costs are considered to be included in the overhead markup as provided in items (5) and/or (6) (1 month (normal use) = 176 hours)

(5) & (6) Overhead and Profit – All other costs not previously mentioned are considered to be included in this item, be it for the general contractor or subcontractor(s).

(7) Credits – Work deleted, material and equipment removed from the contractor, stored and/or returned shall be credited to the cost of the change order, less costs.

The Contractor shall furnish itemized statements of the cost of the work ordered and shall give the Engineer access to all accounts, bills and vouchers relating thereto; and unless the Contractor shall furnish such itemized statements, and access to all accounts, bills and vouchers, he shall not be entitled to payment for any items of extra work for which such information is sought by the Engineer. Deviations from any of the above will be reviewed for financial assistance on a case-by-case basis.

The change order will be prepared in such manner as to clearly separate Eligible and Ineligible Costs.

CHANGE ORDER FORM

PM-10 Attachment 1 Page 1 of 2

SRF Number _____
Public Entity _____
Contract Number _____
Change Order Number _____

Contract Amount (As Bid) \$ _____

Net Change in Contract Price (this change order) \$ _____

Total Adjusted Contract Price (including this and all other change orders) \$ _____

This change order extends the time to complete the work by _____ calendar days.

The extended completion date is _____

This change order checked by _____
(Chief) Resident Engineer Date

This change order is requested by: _____

This change order is recommended by: _____

Consultant Engineer P.E. Number Date

The undersigned agree to the terms of the change order.

Contractor Date

Owner Date

Certification of Appropriation under M.G.L. c.44, §31C: Adequate funding in an amount sufficient to cover the total cost of this change order is available.

By: _____
Certification Officer (Auditor, accountant, treasurer) Date

Do not write below: this space reserved for STATE AGENCY APPROVAL

DEP/DMS spkg 2020-03-09

CHANGE ORDER FORM (Continued)

PM-10 Attachment 1

Page 2 of 2

Public Entity _____

SRF No: _____ Contract No. _____ Change Order No. _____

Contract Title: _____

Owner's Name: _____

Owner's Address: _____

Contractor's Name: _____

Contractor's Address: _____

Description of Change

Reason for Change

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DEP-DMS-F Page 12 of 24

POLICY MEMORANDUM NO. PM-11

UTILITY RELOCATION

The construction of treatment facilities, sewers, pumping stations, force mains and appurtenant work can cause the relocation of utilities. Costly relocation can sometimes be minimized by early communication and cooperation of the representatives of the municipality (owner) and the utilities.

Every possible effort should be made by the owner and each utility to establish the location of existing utilities in the vicinity of the proposed construction. The owner or its consulting engineer should make every reasonable effort to design the proposed construction so that relocation of existing utilities is minimized whenever possible. If the proposed construction is in an area of many existing utilities or in an otherwise critical area, the utilities are encouraged to mark the location of their existing utilities at the site during the design phase of the project.

During the design phase of the project, the municipality should provide timely notice to all utilities known or thought to have facilities in or proximate to the site of such future construction.

POLICY MEMORANDUM NO. PM-12

**REFUNDABLE DEPOSITS FOR
PLANS AND SPECIFICATIONS**

For each set of project plans and specifications provided, the owner may require a deposit in form of cash or other appropriate security, in an amount sufficient to cover the costs of production of such plans and specifications.

Upon return of the plans and specifications to the owner within a reasonable time and in good condition, such deposit shall be refunded.

Actual mailing costs, if any, shall be borne by the party requesting such plans and specifications.

POLICY MEMORANDUM NO. PM-13

BID OPENING PROCEDURES

As a minimum, bid documents shall be reviewed/inspected for conformance to the following bid opening procedure in the order presented below. Failure to comply with any of these steps shall render the bid non-responsive and upon determination of such non-responsiveness, such bid shall be rejected immediately, set aside, and shall receive no further consideration.

Bid Opening Procedure

Step #1. **Timeliness** – The bid must be filed at the place and within the time specified therefore in the invitation to bid, and no bid shall be accepted after such time. The time at which a bid is filed should be time/date stamped or otherwise prominently noted on the bid;

Policy Memorandum No. PM-13 – Bid Opening Procedures (Con't)

Step #2. Bid Security – Properly executed bid security, in the amount and terms specified in the invitation to bid (equal to 5% of Base Bid or Highest Possible Amount considering all alternatives) shall be placed in a seal envelope and attached to the outside of the envelope containing the bid at the time of its submission;

A. Bid Bond

The Bid bond must be dated On or Before the Bid Date;
Issued by a Bonding Company Licensed in Massachusetts;
Accompanied by a Current Power of Attorney;
Signed by Surety;

B. Check

The Check must be a Certified, Cashiers or Bank Treasurer's;
Dated On or Before the Bid Date;

Step #3. Bid Signature – The bid and all accompanying documents so required shall be signed by the bidder or its authorized representative before submission;

Step #4. Addenda – All addenda shall be sent certified mail, return receipt requested, by the owner to all individuals and organizations which have received plans and specifications and shall be mailed not later than five days prior to the date established for submission of bids. All bidders shall include with their bids written acknowledgement of receipt of all addenda, which acknowledgement may be on a form provided therefore by the owner.

Alternates – Any Alternates shall be acknowledged.

Step #5. Written Dollar Amounts – The total dollar amount of each bid shall be read, and the three lowest bids shall be selected for further consideration. The remaining bids shall then be set aside. The three apparent low bids shall be read to determine whether the unit price for each line item of each bid has been written therein in words. If it has not, such bid shall be rejected and shall receive no further consideration. ***Bid amounts shall be consistent (words vs. numbers) and if words and numbers differ, the words govern.*** This procedure shall then be repeated with the next apparent low bid until three are acceptable which have all the unit prices written in words, at which time the lowest bid shall be announced as the apparent low bidder, and the bid opening procedure shall be closed.

The Division recommends that this policy memorandum be included in all contract specifications and that the owner's evaluator(s) use the attached form (PM-13 Attachment 1) for bid opening procedures.

The Contractor's Bid Opening Checklist also attached hereto, is for use by each contractor to assure that his bid conforms with this policy memorandum. It is recommended that the checklist (PM-13 Attachment 2) be included in information for bidders, or at the end of the bid proposal, or in some other prominent part of the bid specifications

FORM FOR BID OPENING PROCEDURES
(to be completed by the owner's evaluator(s))

CONTRACT NO.: _____

DATE: _____

CONTRACT NAME: _____

BID OPENING TIME: _____

All non-responsive bids shall be rejected forthwith by the awarding authority upon determination of such bids' non-responsiveness at the time bids are opened and read. Failure to comply with any one of the requirements shall render the bid non-responsive, and upon determination of such non-responsiveness such bid shall be rejected and receive no further consideration.

	BIDDER	A = Acceptable			N-R = Non-Responsive (explain reasons on supplemental sheet & attach)		COMPLIANCE (CIRCLE ONE)		
		1. TIMELINESS	2. BID SECURITY	3. SIGNATURE	4. ADDENDA ALTERNATIVES	5. DOLLAR AMOUNTS	WRITTEN	YES	NO
1		_____	_____	_____	_____	_____	_____	YES	NO
2		_____	_____	_____	_____	_____	_____	YES	NO
3		_____	_____	_____	_____	_____	_____	YES	NO
4		_____	_____	_____	_____	_____	_____	YES	NO
5		_____	_____	_____	_____	_____	_____	YES	NO
6		_____	_____	_____	_____	_____	_____	YES	NO
7		_____	_____	_____	_____	_____	_____	YES	NO
8		_____	_____	_____	_____	_____	_____	YES	NO
9		_____	_____	_____	_____	_____	_____	YES	NO
10		_____	_____	_____	_____	_____	_____	YES	NO
11		_____	_____	_____	_____	_____	_____	YES	NO
12		_____	_____	_____	_____	_____	_____	YES	NO

Evaluator(s)

POLICY MEMORANDUM NO. PM-14

PAYMENT FOR ROCK EXCAVATION

There shall be in the contract documents a separate pay item for rock excavation. For such purposes, “rock” shall mean igneous, sedimentary, metamorphic, and conglomerate rock, which for excavation must be drilled, blasted, broken, or ripped by power tools. Boulders and concrete structures one cubic yard or greater, however removed, are included within this definition of rock for payment purposes. At the option of the owner or his representative a separate pay item for boulders, concrete structures, or concrete road base may be used.

<u>Depth From Ground Surface</u> <u>To Invert Pipe</u>	<u>Pay Width</u> <u>(Nominal Pipe Diameter)</u>	
* 0 – 12’	0-24”	Over 24”
* Over 12’ – 20’	5’0”	D+3’0”
	7’0”	D+5’

Engineer’s plans and specifications shall establish pay limits below pipe and structures.

- See PM-14 Attachment 1 (typical cross section)

Payment width for depths over twenty feet (20’) shall be determined on a case-by-case basis consistent with the foregoing chart.

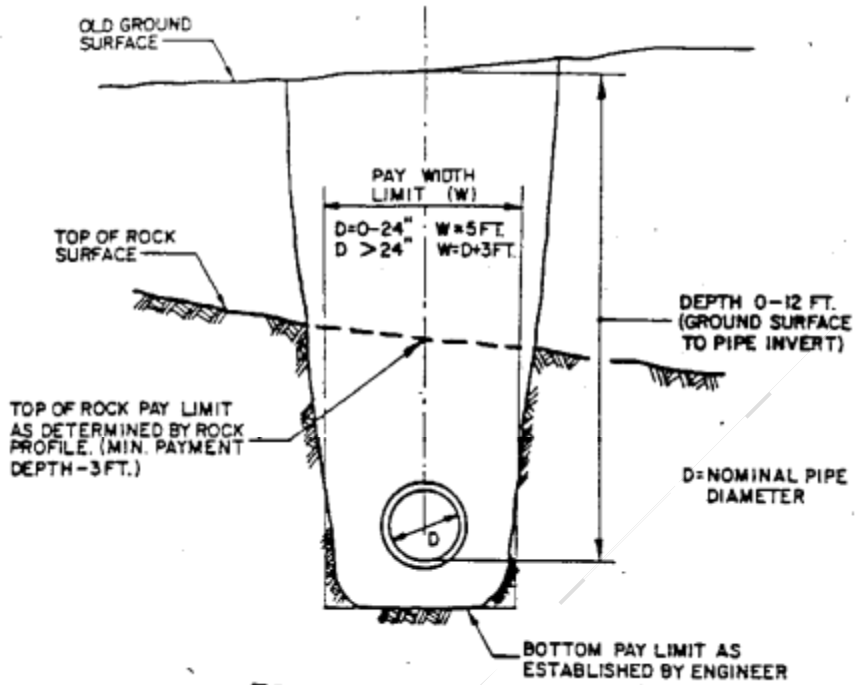
The pay limit for rock removal outside proposed manholes shall commence one foot (1’) outside the widest dimension of the structure of shall be the maximum connecting trench width, whichever is greater.

Payment depth for rock which is encountered in a trench shall be no less than three feet (3’) when removal can be accomplished only by drilling and blasting or by use of jack (air or hydraulic) hammers.

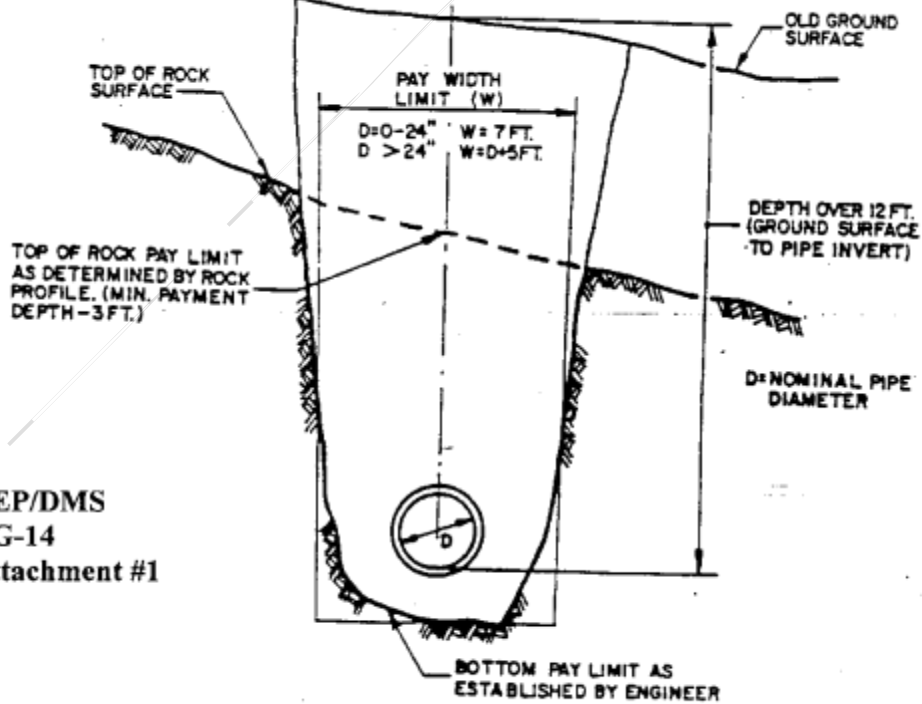
Payment for rock removed, using the same or equal equipment as utilized for normal trench excavation, shall be limited to the actual depth removed within the limits established by the contract documents.

Boulders encountered within the pay limits of excavation, whose volume is one cubic yard or greater, part of which extends outside said limits shall be paid in accordance with the actual volume excavated.

CG-14 ROCK EXCAVATION



FOR DEPTH 0 TO 12 FEET



FOR DEPTH OVER 12 FEET AND UP TO 20 FEET

DEP/DMS
CG-14
Attachment #1

POLICY MEMORANDUM NO. PM-15

TRAFFIC POLICE

The reasonable costs for police details required for traffic control on a construction project which receives financial assistance shall be considered as an eligible administrative cost. A police detail item shall not be included as a bid item in the contract documents.

“Police” as used in this memorandum includes local, county, capital, state, regular and auxiliary police.

Owner’s Responsibility

It shall be the owner’s responsibility to submit in writing the hourly rate of pay to be established for detailed traffic police and each change in rate during the course of the project. It is the owner’s responsibility to arrange, document and pay for such police details. The owner or its representative shall meet with the police chief or other officer in charge of police detail duty to review contract needs. The owner shall maintain a daily record of the following:

- a. Officer’s name
- b. Hours worked
- c. Location of assignment
- d. Hourly rate

POLICY MEMORANDUM NO. PM-16

**DOCUMENTATION REQUIRED TO
SUBSTANTIATE CONTRACT QUANTITIES**

<u>Unit</u>	<u>Documentation required</u>
Acres (A)	Location, station, offset and calculations. Location = Street right-of-way, etc; Station = Point on Baseline; Offset = Distance left or right of Baseline
Cubic Yard (C.Y.)	Location, stations, widths, depths, calculations and Cross sections as necessary
Each (Ea.)	Location, station, and offset.
Gallon (Gal.)	Location, stations, calculations (if appropriate) and delivery slips.
Hour (Hr.)	Hours and location.
Linear Feet (L.F.)	Location, stations, and offsets.
Month (Mo.)	Location, period of time and calculations if applicable.

1000 Foot Board Measure (MFBM)	Location, stations, offset, elevations, grade, and calculations. Attach invoices where applicable.
Pound (Lb.)	Locations, stations, and calculations (if applicable). Attach Delivery weight slips.
Square Feet (S.F.)	Locations, stations and calculations
Square Yard (S.Y.)	Locations, stations and calculations
Ton	Locations, stations and calculations (if applicable). Attach Delivery weight slips.
Vertical Feet (V.F.)	Locations, stations, elevations, and offsets.

Note:

1. All of the above, that apply must be submitted with a final payment request or change order as applicable.
2. Where in place measurement is not possible or practical, delivery slips may be used to substantiate quantities. 3. Change orders – See PM-10 in which some of the above may be applicable in justifying materials, equipment and labor.
4. When necessary, itemized quantities must be separated into eligible and non-eligible units with separate calculations to justify eligible costs.
5. Overruns and underruns of any specific item shall be explained with an appropriate sentence or paragraph.
6. On all quantities, units of payment shall be maintained at the project site and shall be updated daily so that upon field inspection by the C.O.E., EPA or DMS, the quantities paid to date can be substantiated.
7. In the case of unforeseen conditions, photos should be submitted with the applicable item in addition to the recommended documentation.
8. Documentation of units of payment shall be clearly legible and cross referenced to the applicable sheets of the record drawings.
9. For record drawings policy, please see PM-4.

DMS Policies 1 through 16 Approved By:

Steven J. McCurdy
Division of Municipal Services

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DEP-DMS-F Page 21 of 24

DWS POLICY 88-02
DEPARTMENT OF ENVIRONMENTAL PROTECTION
POLICY FOR REVIEW OF SEWER LINE/WATER SUPPLY PROTECTION

The Department of Environmental Protection seeks to protect existing and potential water supplies from the potentially negative effects of leaking sewer lines through the adoption of a Department policy on this subject.

The following restrictions will apply to new sewer construction statewide:

Gravel Packed Wells

- ~ Within the 400 foot radius protective distance around gravel packed wells, all sewer lines and appurtenances are prohibited, unless they are necessary to eliminate existing and/or potential sources of pollution to the well.

Tubular Wells

- ~ Within the 250 foot radius protective distance around tubular wells, all sewer lines and appurtenances are prohibited, unless they are necessary to eliminate existing and/or potential sources of pollution to the well.

Gravel Packed and Tubular Wells

- ~ Within a minimum radius of 2,640 feet or unless otherwise documented by an appropriate study specifically defining the area of influence and approved by the Division of Water Supply, all sewer lines and appurtenances will be designed and constructed for maximum water tightness.
- Force Mains or Pressure Sewers: shall be tested at 150% above maximum operating pressure or 150 p.s.i. whichever is greater. Testing shall conform to the requirements of the American Water works Association (AWWA) standard c 600.
- Gravity Sewers: shall be tested by approved methods which will achieve test results for infiltration or exfiltration of less than 100 gallons/inch diameter/mile/24 hours.
- Manholes: shall be installed with watertight covers with locking or bolted and gasketed assemblies. Testing for infiltration/exfiltration shall conform to the same standards as the maximum allowed for pipes in the manhole as required for gravity sewers, indicated above.
- Satisfactory test results for Force Mains, Manholes and Gravity Sewers shall be performed prior to the expiration of the contractor's one year guarantee period.
- All pumping stations within this zone shall have standby power high water alarms telemetered to an appropriated location that is manned at all times. An emergency contingency plan must be developed by the owner and approved by the BWR.
- A minimum of Class B bedding as defined by WPCF-MOP9 must be used for all piping.
- Service connections (laterals and house connections) shall be rigidly inspected by the appropriate municipal official. Certified inspection reports shall be submitted to the BWR.

Bedrock Wells

The above requirements are the same for bedrock wells, with the Department reserving the right to require more stringent controls on a case-by-case basis.

Surface Water Supplies

- ~ Within 100 feet of all surface water supplies and tributaries all sewer lines and appurtenances are prohibited except as required to cross tributaries or to eliminate existing or potential pollution to the water supply. In the latter case, watertight construction methods shall be use.
- ~ Tributary stream crossings shall employ watertight construction methods of sewer lines and manholes. Watertight construction must extend 100 feet to either side of the stream.
- ~ Within 1,000 feet of surface water supplies and tributaries, all pumping stations shall have standby power and high water alarms telemetered to an appropriate location that is manned at all times. An emergency contingency plan must be developed by the owner of the wastewater treatment facility and submitted to the BWR for approval.
- ~ Beyond 1,000 feet and within the watershed of surface water supplies the Department may in specific circumstances after review, require additional controls.

Potential Public Water Supplies

The above requirements also apply to potential public water supplies.

Baseline Data Requirements

Two (2) copies of an appropriately scaled map(s) shall be submitted to the Department which details the proposed sewers and/or appurtenances and also includes the following:

- (1) the location of all nearby existing or potential surface water supplies, tributaries thereto, and watershed boundaries;
- (2) the location of existing and potential public and municipal potable groundwater supply wells.

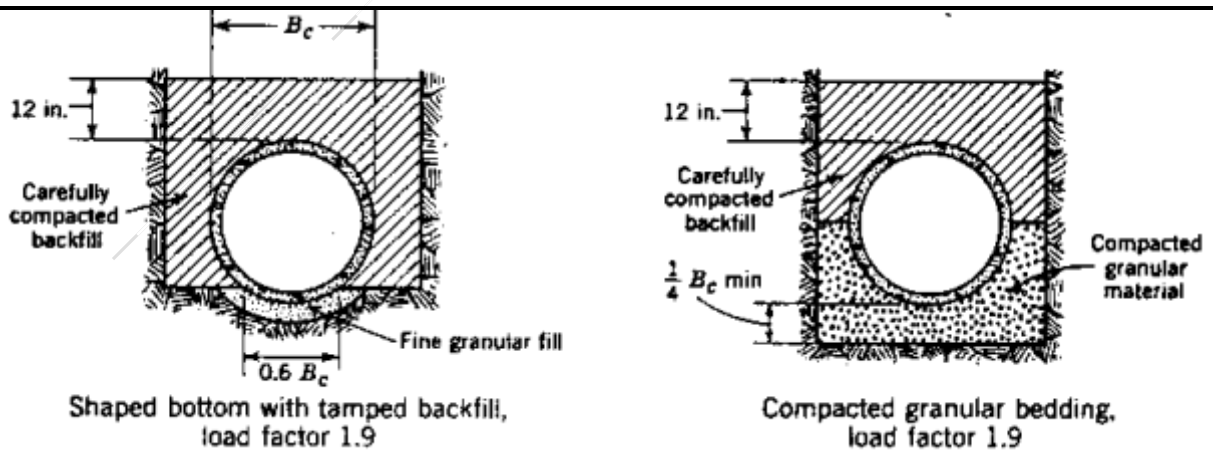
The Department reserves the right to impose more restrictive measures than those contained in this policy as deemed appropriate.

Definitions

- Appurtenances – all attachments to sewer lines necessary for the transport and operation and maintenance of sewer lines, including manholes, pumping station, siphons, etc.
- Area of influence – that area of an aquifer which contributes water to a well under the most severe recharge and pumping condition that can be realistically anticipated (i.e. pumping at the safe yield of the well for 180 days without any natural recharge occurring). It is bounded by the groundwater divides which result from pumping the well and by the contact of the edge of the aquifer with less permeable materials such as till and bedrock. At some locations, streams and lakes may form recharge boundaries.
- Potential public water supply – areas designated by communities for water supply purposes where land has been set aside and Department approved pump tests conducted and surface water supplies as defined below.
- Surface Water Supply – Waters classified as Class A by the DWPC.
- Public Water Supply Systems – as defined in 310 CMR 22.02 (DEP Drinking Water Regulations).

- Class B Bedding – as defined in WPCF Manual of Practice No. 9.

APPROVED: (Signature on File)



Class B---First-Class Bedding – Class B bedding may be achieved by either of two construction methods:

- a. Shaped Bottom with Tamped Backfill. The bottom of the trench excavation shall be

shaped to conform to a cylindrical surface with a radius at least 2 in. (5 cm) greater than the radius to the outside of the pipe and with a width sufficient to allow six-tenths of the width of the pipe barrel to be bedded in fine granular fill placed in the shaped excavation.

Carefully compacted backfill shall be placed at

the sides of the pipe to a thickness of at least 12 in. (30 cm) above the top of the pipe.

Shaped trench bottoms are difficult to achieve under current construction conditions.

- b. **Compacted Granular Bedding with Tamped Backfill.** The pipe shall be bedded in compacted granular material placed on a flat trench bottom. The granular bedding shall have a minimum thickness of one-fourth the outside pipe diameter and shall extend halfway up the pipe barrel at the sides. The remainder of the side fills and a minimum depth of 12 in. (30 cm) over the top of the pipe shall be filled with carefully compacted material.

APPENDIX G
Davis Bacon Act Requirements

All construction projects are subject to the Davis Bacon wage rate requirements and must include the appropriate sections of the following document in its entirety in the contract documents.

The vast majority of SRF projects will be bid by Governmental Entities (i.e., Cities, Towns, Authorities, Water Districts, Wastewater Districts). These projects must include the following language in construction contracts:

I.3. Contract and Subcontract Provisions

I.4. Contract Provisions for Contracts in Excess of \$100,000 (if applicable)

I.5. Compliance Verification

This language may be found on pages DB-3-DB-11.

In certain cases, SRF projects may be bid by non-Governmental Entities (i.e., private water companies, private PWSs, etc.). These projects must include the following language in construction contracts:

II.3. Contract and Subcontract Provisions

II.4. Contract Provisions for Contracts in Excess of \$100,000 (if applicable)

II.5. Compliance Verification

This language may be found on pages DB-11-DB-21

Preamble

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

Occasionally, the subrecipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section II-3(ii)(A), below and for compliance as described in Section II-5.

I. Requirements For Subrecipients That Are Governmental Entities:

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has

questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact Valerie Marshall at EPA Region 1 (617-918-1674) for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <https://www.dol.gov/whd/govcontracts/dbra.htm>

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

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

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

(i) While the solicitation remains open, the subrecipient shall monitor www.wdol.gov weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a 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 2012 Appropriations Act, the following clauses:

(1) Minimum wages.

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

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein:

Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for 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 subrecipient(s) 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 subrecipient (s) 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 request 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 subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, 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 of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

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

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

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, 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 subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/whd/forms/wh347.pdf> 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 subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

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

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

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

- (5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- (6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
- (7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- (8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29

CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

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

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

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

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

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other

Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The subrecipient 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 subrecipient 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.

(b) The subrecipient 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 subrecipient 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. Subrecipients 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. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient 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 subrecipient 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 subrecipient 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. Subrecipients 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 subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients 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 https://www.dol.gov/whd/whd_district_offices.pdf.

II. Requirements For Subrecipients That Are Not Governmental Entities

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance with respect to subrecipients that are not governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient for guidance. If a State recipient needs guidance, the recipient may contact Valerie Marshall at EPA Region 1 (617-918-1674) for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <https://www.dol.gov/whd/govcontracts/dbra.htm>

Under these terms and conditions, the subrecipient must submit its proposed DB wage determinations to the State recipient for approval prior to including the wage determination in any solicitation, contract task orders, work assignments, or similar instruments to existing contractors.

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

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients must obtain proposed wage determinations for specific localities at www.wdol.gov. After the Subrecipient obtains its proposed wage determination, it must submit the wage determination to (insert contact information for State recipient DB point of contact for wage determination) for approval prior to inserting the wage determination into a solicitation, contract or issuing task orders, work assignments or similar instruments to existing contractors (ordering instruments unless subsequently directed otherwise by the State recipient Award Official).

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

(i) While the solicitation remains open, the subrecipient shall monitor www.wdol.gov on a weekly basis to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(c) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(d) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(e) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a 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 2011 Full-Year Continuing Appropriation, the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for 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 subrecipient(s) 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 subrecipient(s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request, and the local wage determination, 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 Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

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

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

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, 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 subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is

available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/whd/forms/wh347.pdf> 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 subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

- (1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

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

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of

fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

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

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

- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (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 subrecipient shall upon the request of the EPA Award Official or an authorized representative of the Department of Labor, 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) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a). The subrecipient 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 subrecipient 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.

(b) The subrecipient 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 subrecipient 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. Subrecipients 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. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c). The subrecipient 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 subrecipient 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 subrecipient 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. Subrecipients 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 subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d). The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients 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 https://www.dol.gov/whd/whd_district_offices.pdf.

EXHIBIT B

GENERAL TERMS AND CONDITIONS

1 WORK OF THE SUBCONTRACTOR

- 1.1 All Work shall be performed in accordance with sound and generally accepted professional practices and industry standards by professional, managerial, and administrative personnel fully qualified in the respective professional disciplines required and practicing under similar circumstances at the same time and in the same locality.
- 1.2 In performing the Work hereunder, Subcontractor shall:
 - (a) Have the complete professional, managerial, or technical responsibility for the validity, accuracy, and reliability of the Work performed, and its work shall conform to all applicable codes, standards, statutes, rules and regulations and the Work criteria and definition;
 - (b) Designate a Manager, in charge of the entire Work on a continuous basis with responsibility for providing adequate supervision or direction and having authority to take all action that may be required in performance of this Agreement. When required by state law, such individual shall have an appropriate engineering license or other appropriate registration;
 - (c) Comply with all government, state and local laws, ordinances, codes or regulations which apply to performance of the Work;
 - (d) Be properly licensed in the governmental jurisdiction where the Work is being performed and where the Project is located and secure at its own expense, all necessary licenses, permits, registrations, certificates and such other documents which may be required by the appropriate governmental authority or authorities to perform the Work.
- 1.3 All Subcontractor's personnel shall be subject to the review and approval by Company. Subcontractor shall immediately remove from the Project any personnel designated by Company; and Subcontractor shall hold harmless Company on account of such action. Subcontractor shall not remove or reassign its Manager in charge of the Work or its other Key Personnel designated in this Agreement without the prior written approval of Company, unless such personnel are no longer employed by Subcontractor.
- 1.4 The Work shall be performed at locations satisfactory to Company and such locations shall not be changed without the written approval of Company. Company shall have access at all times to the locations where Work is performed and to all of the drawings, specifications, data, calculations, models, test results and specimens, documents and other things related to the Work or the Project.
- 1.5 Subcontractor shall be responsible for the professional quality, technical accuracy and timely completion of its services furnished under this Agreement. In the event Subcontractor's services hereunder should not prove satisfactory to Company or Client, as a result of human error, omission or otherwise, Subcontractor shall, without additional compensation, and at its own cost and expense, remedy the defective services and the consequences thereof, provided such corrective services are requested in writing by Company or Client, within the period of warranty for such corrective Work as required by Client of Company under the Prime Contract executed by and between Client and Company.
- 1.6 Review and approval by Company of Subcontractor's drawings, samples, or other representations shall not relieve Subcontractor of the obligation to complete the entire Work in strict compliance with the requirements of this Agreement and to represent to Company that the Work will be sufficient and adequate to fulfill the purposes of the Project, and satisfy all applicable obligations and requirements of Company under the Prime Contract.

2 SCHEDULE AND DELAYS

- 2.1 Time is of the essence in this Agreement. Subcontractor agrees to commence the Work promptly when directed by Company and to prosecute the Work diligently to completion. Subcontractor shall schedule its services in compliance with Company's directions and consistent with the Project schedule. The schedule for the Work shall be subject to revision by Company to coordinate the overall Project progress. In the event the Work is delayed, Company may direct the Subcontractor to supplement its labor force, add equipment, or work overtime at Subcontractor's expense in order to alleviate any delay.
- 2.2 Delays caused solely by Company, its Client, or incurred as a result of "Force Majeure" which shall only include acts of God, fire, labor strikes or picketing, epidemic, pandemic, and unseasonable weather shall be excusable and shall entitle Subcontractor to an extension of the Project schedule, but there shall be no adjustment in the Subcontractor's compensation. Company will determine the normal working hours for the Work and overtime shall be subject to Company's prior written approval.
- 2.3 If the Prime Contract imposes the risk of penalties or liquidated or other damages on Company for delays, then, to the extent such penalties or damages are imposed on Company because of delays within the control of Subcontractor, then Subcontractor shall defend, hold harmless, and indemnify Company against such penalties or damages.

3 PERMITS

Subcontractor shall be solely responsible for acquiring and maintaining, at its own cost, any and all permits, licenses, easements, waivers and permissions of every nature necessary to perform the Works in full compliance with any applicable laws and/or regulations.

4 CHARGES AND PAYMENT CONDITIONS

- 4.1 Subcontractor agrees to provide such supporting documentation for each invoice as Company may reasonably require. Company's payment terms are NET 30 (i.e., undisputed amount paid within thirty (30) days after receipt of a correct invoice, which references the Company's Purchase Order Number). Payment of any invoice by Company shall not imply inspection, approval, or acceptance of the Work by Company or Client.

Subcontractor shall bear the risk of Client's insolvency, non-payment, and dispute of amounts invoiced. In the event of non-payment by Client, Company shall not be obligated to make payment to Subcontractor, but both parties shall cooperate in seeking payment from Client. **It is expressly acknowledged that receipt of payment by Company from the Client on account of the work performed by the Subcontractor shall be a condition precedent to any obligation by Company to make any payment to the Subcontractor hereunder.**

The final milestone payment invoice, not less than 10% of the Agreement Price, shall be paid upon completion and acceptance of the Work by Company and Client. Payment of any invoice by Company shall not imply review, approval, or acceptance of the Work by Company.

- 4.2 Subcontractor shall certify to Company in writing at the time of submittal of each invoice that all sub-subcontractors, subconsultants and suppliers have been paid for work and material from previous progress payments received, prior to receipt of any further progress payments. This provision in no way creates any contractual relationship between any sub-subcontractor, subconsultant or supplier and Company or any liability on Company for the Subcontractor's failure to make timely payments to them.
- 4.3 As a condition precedent to Company's final payment under this Agreement, Subcontractor shall furnish certifications, satisfactory to Company, that state that no liens of any kind, including, but not limited to, mechanics' liens or other claims arising directly or indirectly out of any act or omission of Subcontractor or any of its subconsultants, sub-subcontractors or suppliers, have been made or attached against the Work or upon any property owned by Company or its Client. Company at any

time, without notice, may pay and discharge liens, claims, and encumbrances filed by Subcontractor's sub-subcontractors or suppliers and deduct the amount paid, together with costs and attorneys' fees, from compensation due Subcontractor hereunder.

- 4.4 The acceptance by Subcontractor of the final payment under this Agreement shall constitute and operate as a release to Company for all claims and liability to Subcontractor, its representatives, subconsultants, sub-subcontractors, supplies and assigns for any additional compensation or payment relating to any and all things done or furnished to the services rendered by Subcontractor. However, final payment shall in no way relieve the Subcontractor of liability for its obligations or for faulty or defective work discovered after final payment.
- 4.5 The compensation to be paid to Subcontractor includes, and Subcontractor shall be liable for and shall pay, and shall defend, hold harmless, and indemnify Company against, all taxes, contributions, interest accrued, penalties imposed, and all taxes, excises, assessments, and other charges levied by any government agent, authority, or any other jurisdictional body on, or because of, the services performed hereunder or any labor, materials, supplies, or services furnished for or used in the performance of the Work.

5 CHANGES AND ADDITIONAL COMPENSATION

- 5.1 Company, by written order (hereinafter "Change Order"), may make changes in the Work including, but not limited to, increasing or decreasing the Work or directing acceleration in the performance of the Work. Where practicable, Company and Subcontractor shall negotiate, prior to the issuance of a Change Order, the amount of any charge for increases or decreases in the Work or schedule change related to the Change Order. In the event the parties cannot agree, Company may issue the Change Order and the Subcontractor shall proceed with the Work, being compensated for the change in Work on a cost reimbursable basis as set forth in Article 4.2.
- 5.2 No change shall be made by Subcontractor in the Work or its manner of performance, without prior instructions from Company, in a written Change Order specifying the change in plans, specifications, procedures, schedule, sequence, or other requirements of this Agreement, and specifying whether there is to be an adjustment in the price for performance and how any such adjustment shall be determined. No adjustment in price or time of performance shall be made for changes in arrangement, aesthetics, substitution of equivalent materials, or equipment or other changes, unless such changes significantly affect Subcontractor's cost of performing the Work. An equitable adjustment will be made in price or time of performance or both, if the change ordered by Company substantially increases or decreases the cost and/or time of performance of the Work. The method of changing the price shall be specified in the Change Order. In the event a Change Order does not specify pricing for services, Subcontractor shall be paid all actual, direct additional cost incurred, without allocation of its home office general and administrative expense, plus ten percent (10%) of such costs, and Subcontractor shall maintain and furnish Company accurate and detailed records daily segregating the cost of the change in the Work. In case of deletion or reduction of the Work by such change, Subcontractor shall not be entitled to anticipated contribution to its home office overhead and profit from any portion of the Work not performed.
- 5.3 Whenever an event occurs or condition arises which Subcontractor considers to constitute a basis for additional compensation or time, and Company has not issued a Change Order, Subcontractor shall so notify Company immediately by telephone, and confirm in writing within five (5) business days, after the occurrence of the event or discovery of the condition, requesting Company to issue a Change Order under the procedure set forth above and forwarding adequate supporting information to substantiate Subcontractor's position. Subcontractor shall not proceed with respect to the event or condition forming the subject of the claim until advised in writing, or orally and confirmed in writing, by Company to do so. Company's liability to Subcontractor for any such events or conditions shall be limited to any sums or extension of time obtained from Client therefor.
- 5.4 Upon receipt of the notice from Subcontractor, Company shall either initiate the Change Order procedure or give other instructions by telephone or in writing, as appropriate. If Company orders Subcontractor to proceed and concludes that no Change Order is warranted, the disagreement shall

constitute a dispute and Subcontractor shall proceed in accordance with Company's instructions. The dispute shall be resolved in accordance with Article 19.0 Disputes.

6 INDEMNIFICATION

Subcontractor releases and agrees to indemnify and defend Company, its Client, their officers, directors, and employees from and against any and all suits, actions, claims, demands, damages, liabilities, interest, attorney's fees, costs, and expenses of whatsoever kind, including those arising out of injury, disease, or death of Subcontractor's employees in any manner directly or indirectly caused, occasioned, or contributed to in whole or in part, or claimed to be caused, occasioned, or contributed to in whole or in part, by reason of any act, omission, fault, or negligence whether active or passive of Subcontractor, its subconsultants or sub-subcontractors, or of anyone acting under its direction or control. Subcontractor's aforesaid release and indemnity shall apply in the event of joint or contributory negligence, whether active or passive, or strict liability of Company or its Client to the fullest extent permitted by law, but in no event shall the release and indemnity obligation apply to liability caused by the willful misconduct or sole negligence of the party released or indemnified.

7 SAFETY

- 7.3 Subcontractor shall be responsible for the health and safety of its employees and the employees of its subconsultants and sub-subcontractors, if any, while present at the Subcontractor's home and branch offices and other locations where Work is performed. While performing Work on Company's or Client's property and/or at Project Sites, Subcontractor shall place the highest priority on safety and safe working practices. Therefore, it will be the responsibility of Subcontractor to provide and maintain a safe working environment for its employees while working on Company's or Client's property and/or Project Sites and to protect the health and safety of Subcontractor's employees, agents and subconsultants and sub-subcontractors and their respective employees, and Company employees, the public and other third parties. All tools, equipment, facilities, and other items used by Subcontractor and practices employed by Subcontractor in accomplishing the Work are considered to be part of the working environment.
- 7.4 Subcontractor shall comply with all applicable laws, rules and regulations relating to health and safety, including but not limited to, those set forth in the Occupational Health and Safety Act, as amended (OSHA).
- 7.5 Whenever Subcontractor has any employees at the site of the Work, either temporarily on visits or on assigned basis, Subcontractor shall comply with all of the regulations and directives of Company and/or the Client with respect to safety, security, entrances, parking areas, sanitation, and other provisions for maintenance of good order and coordination of the activities of all participants in the Work as a whole.

8 DOCUMENTS

- 8.1 The Work and all records relating to it, including, without limitation, all drawings, specifications, reports, summaries, samples, photographs, memoranda, notes, calculations, and other documents developed by Subcontractor during the period of performance of this Project is work product and shall be deemed to be the property of Company or Client. Subcontractor shall maintain all such materials in kind, or on microfilm, except for samples, for a period of not less than two (2) years after completion of the Work, or for such longer time as may be required by the Prime Contract.
- 8.2 All dimensions in notes and drawings prepared in the performance of the services specified in this Agreement shall be in the foot/pound system, unless otherwise required or approved by Company.
- 8.3 Subcontractor shall return to Company all drawings and written materials furnished to Subcontractor by Company, including all copies thereof, if any, made by Subcontractor, except that Subcontractor may retain one copy of the same in its files for record purposes only.

- 8.4 Subcontractor will limit access to Company's and Client's confidential and technical information to Subcontractor's employees who reasonably require such access for performance of Work pursuant to this Agreement.

9 PATENTS AND COPYRIGHTS

- 9.1 If Subcontractor or its personnel make any inventions or prepare copyrightable material as a result of the performance of this Agreement, Subcontractor promptly shall disclose such inventions or materials to Company. Subcontractor agrees to grant, and hereby grants, to Company the entire right, title, and interest in and to such inventions and copyrightable materials, and Subcontractor shall cooperate with Company and execute all documents necessary to perfect Company's rights in the inventions or materials and to allow Company to prosecute and obtain patents and copyrights thereon.
- 9.2 Subcontractor shall indemnify and hold harmless Company and Client against any loss, cost or liability for infringement of any period or proprietary rights involving any services furnished hereunder.

10 CONFIDENTIALITY AND NONDISCLOSURE

Subcontractor shall not disclose information regarding this Agreement or the Work, except for information that is required for the purposes of the performance of Work or in the public domain, to any person. Noncompliance by the Subcontractor or others under the control or direction of the Subcontractor with this obligation shall be sufficient cause for Company immediately to terminate this Agreement for cause without prior written notice, and shall entitle Company to injunctive and other relief from a court of competent jurisdiction. In addition, Subcontractor agrees to comply with any more restrictive confidentiality requirements imposed by Client in the Prime Contract.

11 AUDIT

Not Used

12 INSPECTION AND NON-WAIVER

- 12.1 Subcontractor shall permit representatives of Company to inspect and observe the Work at all reasonable times, and all Work shall be subject to acceptance and approval by Company. However, the exercise of any such rights shall not relieve Subcontractor of its responsibility to perform the Work in accordance with all Agreement requirements.
- 12.2 The failure of Company to insist upon strict performance of any of the terms of this Agreement or to exercise any rights conferred by this Agreement shall not be construed as a waiver of its right to assert or rely on any such terms or rights on any future occasion or as a waiver of any other terms or rights.

13 REMEDIES UPON DEFAULT

In addition to any rights provided by any other provisions of this Agreement or any applicable law, Company shall have the right to retain any money in its possession due to the Subcontractor under this Agreement so as to reimburse Company for any damage or costs caused by or attributable to the acts or omissions of the Subcontractor with respect to this Agreement or any other subcontract or contract between the parties including, but not limited to, Subcontractor's late completion, breach of warranty, breach of guarantees, negligence or any other contractual breach. Failure to withhold payment shall in no event be construed as a waiver of any right of Company to assert any claim for breach of any obligation under this or any other agreement between the parties.

14 WARRANTY

- 14.1 Subcontractor warrants that all Works will be as represented by Subcontractor, free from defects in materials, workmanship, and design, in conformance with all applicable specifications, descriptions,

samples, and drawings referred to in this Agreement and in Order(s), merchantable and fit for their intended purposes.

- 14.2 Subcontractor warrants that the production, packaging, labeling and transportation of all goods will comply with all applicable national, regional, state and local laws, rules, regulations, ordinances and orders.
- 14.3 Subcontractor warrants that it has the experience and ability as may be necessary to perform all Works with a high standard of quality and that all Works will be performed in a workmanlike, professional manner and in accordance with the highest standards in the industry.
- 14.4 Subcontractor warrants that it will make all appropriate tax payments and tax withholdings for all individuals it provides to perform Works and, in the case of Works performed in the United States of America, will verify such individuals as being legally able to work in the United States.
- 14.5 All warranties will survive inspection, testing and acceptance of the Works and expiration or termination of this Agreement.
- 14.6 All warranties are considered independent. Each will be separately construed and interpreted without reference to any other warranty.

15 TERMINATION AND SUSPENSION

15.1 Termination for Convenience. Company, by ten (10) days written notice, may terminate this Agreement in whole or part for any reason, including solely for its convenience. Subcontractor will be paid for reasonable costs of all work performed including a reasonable overhead and profit. No money will be paid for interruption of business or loss of business opportunities, for overhead and profit on Work not completed, or for any other intangible costs. In no event shall the total sums paid Subcontractor exceed the Agreement price.

15.2 Termination for Cause. If, in the reasonable opinion of Company, the Subcontractor shall at any time, (1) fail in any material respect to prosecute timely the Work, (2) fail to comply with any material provision of this Agreement, (3) make a general assignment for the benefit of its creditors, (4) have a receiver appointed, or (5) become insolvent, then, after serving seven (7) days written notice, unless the condition specified in such notice shall have been eliminated within seven (7) days, Company, at its option and without voiding the other provisions of this Agreement, may, after an additional seven (7) days, (i) take such steps as are necessary to overcome the condition, in which case the Subcontractor shall be liable to Company for any cost hereof, or (ii) partially or wholly terminate for default the Subcontractor's continued performance of its duties under this Agreement. In the event of a termination for default, Company may, at its option, use all of Subcontractor's work product for completion of the Work by others, take assignment of any or all of the Subcontractor's agreements with subconsultants, sub-subcontractors or suppliers and/or have the remainder of the Subcontractor's obligations completed by whatever means Company deems expedient. In case of a termination for default, the Subcontractor shall not be entitled to receive any further payment until the Work shall be fully completed and accepted by Company and the Client and payment made in full by the Client at which point the Subcontractor shall be paid the remainder of its fee less any costs or expenses incurred by Company as a result of Company taking any steps necessary to overcome the deficiency or complete the Subcontractor's duties hereunder.

15.3 Suspension.

- (a) Company may order Subcontractor, in writing, to suspend, interrupt or defer all or any part of its Work for such period of time as may be appropriate to the convenience of Company and/or Client.
- (b) If the performance of all or any part of Subcontractor's Work is suspended, interrupted or deferred by the direction of Company for a period greater than ninety (90) continuous days, an equitable adjustment shall be made for any increase in the cost of affected Work and the

schedule of such affected Work shall be adjusted in accordance with the provisions of this Agreement. However, no adjustments shall be made for any such suspension, interruption or deferment whereby performance would have been so suspended, interrupted or deferred by any other cause, including the fault or negligence of Subcontractor, or whereby an equitable adjustment is provided for or excluded under any other provision of this Agreement. Should any such suspension, interruption or deferment be directed by the Client, any equitable adjustment in cost and/or schedule adjustment, subject to the provisions of this Article, Subcontractor shall be compensated therefor only to the extent Company can recover such cost and/or schedule adjustment from the Client.

- (c) No claim hereunder shall be allowed unless such claim, in an amount stated, is asserted in writing within fifteen (15) days after termination of such suspension, delay or interruption, but in no case later than the date of Final Payment.

16 INDEPENDENT CONTRACTOR, NON- ASSIGNMENT, AND SUBCONTRACTS

- 16.1 In the performance of the Work, Subcontractor shall operate as, and have the status of, an independent contractor and shall not act as or be an agent or employee of Company or its Client. As an independent contractor, Subcontractor shall be solely responsible for executing the Work.
- 16.2 Subcontractor shall not assign this Agreement without the prior written consent of Company. After assignment, this Agreement shall inure to the benefit of, and shall be binding upon, Company's and Subcontractor's respective successors and assigns. Subcontractor shall notify Company in writing of each subconsultant or sub-subcontractor it intends to use before entering into a subcontract. None of the Work may be subcontracted by Subcontractor without the prior written approval of Company.
- 16.3 Each subcontract with a subconsultant or sub-subcontractor must contain provisions, or be made expressly subject to provisions, for changes, notice, indemnification, insurance, nondisclosure and confidentiality, patents and inventions, documents, termination, suspension, dispute resolution, inspection and non-waiver, ethics and gratuities, employment practices, audit, liens and encumbrances, at least as restrictive in form and content as those contained or referred to in this Agreement. Subcontractor shall advise each prospective subconsultant or sub-subcontractor of these requirements and shall ensure that each subconsultant or sub-subcontractor complies with them.

17 TRUTH IN NEGOTIATIONS REPRESENTATIONS

- 17.1 Subcontractor warrants that sub-subcontractor has not employed or retained any company or person other than a bona fide employee working solely for Subcontractor, to solicit or secure this Agreement and that has not paid or agreed to pay any person, company, corporation, individual or firm, other than a bona fide employee working solely for subcontractor, any fee, commission, percentage, gift or any other consideration contingent upon or resulting from the award or making of this Agreement.
- 17.2 Subcontractor warrants that the prices for the Work sold Company hereunder are not less favorable than those currently extended to any other customer of Subcontractor for the same or similar services in similar quantities. Subcontractor further warrants that wage rates and other factual unit costs supporting the compensation are accurate, complete and current at the time of the Agreement. The Subcontractor agrees that the original Agreement price and any additions thereto shall be adjusted to exclude any significant sums by which Company or Client determines the Agreement price was increased due to inaccurate, incomplete, or non-current wage rates and other factual unit costs.

18 ETHICS AND GRATUITIES

The Subcontractor represents and warrants that in connection with its performance of this Agreement, it has not or will not, directly or indirectly, pay, give, offer, promise to pay or give, or authorize the payment or giving of any money, gift, or things of value to any governmental official, political party, or candidate for political office; or to any person who knowingly will give all or a portion of the money, gift, or thing of value to any such official in its official capacity. Breach of this

representation or warranty shall be considered a default under the terms of this Agreement and shall, in addition to any other remedies, entitle Company to recover all amounts paid to Subcontractor under this Agreement.

19 EMPLOYMENT PRACTICES

Subcontractor shall not discriminate against any employee or applicant for employment or applicant for employment because of race, color, national origin, religion, sex, age or for any reason prohibited by law. To the extent applicable to the Work on this Project, Subcontractor shall comply with Executive Order 11246 or any amendment, replacement or counterpart thereof.

20 COMMUNICATIONS AND NOTICES

- 20.1 All inquiries the Subcontractor may have concerning this Agreement shall be made to Company and not directly to the Client.
- 20.2 All of Subcontractor's correspondence/ communication regarding this Agreement shall include Company's Agreement Number and Work Description, and shall be mailed or delivered to Company's Designated Representative.
- 20.3 Notices of changes, deficiencies, delays, claims or disputes shall be in writing, and shall furnish full information to the extent available. The party notified will acknowledge receipt by endorsement of a copy if requested or will otherwise confirm receipt in writing. To avoid difficulty in delivery of Notice, sufficient Notice shall be deemed to have been given by mailing via Registered or Certified Mail or equivalent to the Site address shown on page 1 of this Agreement.

21 DISPUTES

- 21.1 The Parties agree to attempt to resolve disputes through informal mediation. The Parties may pursue their respective remedies at law or equity for any claim, controversy, or dispute relating to this Agreement, except as follows: Subcontractor acknowledges that the Prime Contract may include a disputes resolution clause pursuant to which Company may be limited to certain dispute resolution procedures such as arbitration or administrative proceedings in the event of a dispute relating to the Prime Contract. In the event that such provisions govern disputes between Company and its Client, Subcontractor agrees to be bound by the procedures in the Prime Contract with respect to disputes under this Agreement in the same manner that Company is bound under the terms of the Prime Contract. Subcontractor consents to joinder in any proceedings between Company and its Client upon Company's request. Subcontractor shall not have the right to join in proceedings between Company and the Client unless Company consents to the joinder.
- 21.2 The Subcontractor shall carry on the Work and maintain the Project schedule during any dispute proceedings, unless otherwise instructed by Company.

22 GOVERNING LAW

This Agreement shall be governed by and construed in accordance with the laws of the jurisdiction in which the Project is located.

23 SETOFF

Company is authorized to deduct any sums owed it by Subcontractor (whether or not the debt arises out of this Agreement) from the payments due Subcontractor under this Agreement. Company may also withhold payment from Subcontractor in an amount sufficient to protect Company from any claims of third parties or any liens which arise as a result of Subcontractor's or its subconsultants' and sub-subcontractors' performance of the Work.

24 SURVIVAL

The warranty, liability, indemnity, audit, ownership of work product, patent, and confidentiality (including publicity releases) provisions of this Agreement shall survive its termination or final settlement. The provisions of this Agreement relating to termination and settlement of disputes and claims (including choice of law) shall survive its termination, but not its final settlement.

25 SEVERABILITY

Any provisions of this Agreement held in violation of any law or ordinance shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon the Parties. Company and Subcontractor shall in good faith attempt to replace any invalid or unenforceable provisions of this Agreement with provisions that are valid and enforceable and that come as close as possible to expressing the intention of the original provisions.

26 REMEDIES

The remedies reserved for Company herein shall be cumulative and additional to any other or further remedies provided in law or equity. Any waiver by Company of any provision of this Agreement shall not constitute a waiver of any other provisions of the Agreement.

27 HEADINGS

The descriptive headings at the beginning of the articles, clauses, and subclauses of this Agreement are provided for convenience only and do not affect the interpretation or construction of this Agreement. In some instances an article or clause contains provisions not covered by the heading hereof, in other instances an article or clause contains provisions that are described in the heading of another article or clause.

EXHIBIT C
COMPENSATION

1.0 AGREEMENT PRICE

- 1.1 Company shall pay Subcontractor for complete, satisfactory and timely performance of the Work in strict accordance with the requirements hereof, the following firm fixed price, which excludes all applicable taxes and which is not subject to escalation: \$_____.
- 1.2 Change Orders
- 1.1. As allowed in DEP's Policy Memorandum #10 - the agreed upon DIRECT LABOR MARKUP (percentage) for Change Orders on this project shall be _____%. The "direct labor mark-up" rate shall account for the cost of Worker's Compensation Insurance, Federal Social Security and State Unemployment Compensation.
- 1.2. The agreed-upon mark-up for Overhead and Profit (OH&P) on this project shall be 15 percent (15%).
- 1.3. The agreed-upon mark-up for the Contractor's Overhead and Profit (OH&P) on Subcontractors shall be five percent (5%).
- 1.4. Any Change Orders authorized on a Time and Materials (T&M) basis shall have daily time and materials forms prepared by the Contractor and signed by Veolia.

2.0 INVOICES

- 2.1 Payment will be made in accordance with Article 3.0 of Exhibit B.
- 2.2 Subcontractor's invoice shall:
- 2.2.1 Reflect Company's Purchase Order ("PO") number and Site ID
- 2.2.2 Be numbered sequentially
- 2.2.3 Be submitted by email to us.apinvoices@veolia.com for approval
- 2.2.4 Be submitted on a monthly basis no later than the fifteenth (15th) day of the following month
- 2.2.5 Show previous amount billed, current amount billed, and amount billed to date by each activity and by the sum of all activities
- 2.2.6 Be accompanied by such supporting documentation as Company may reasonably require
- 2.3 An executed waiver and release form in the respective formats referenced as Exhibit C.1 - Interim Waiver And Release of Liens and Claims Upon Payment and Exhibit C.2 - Unconditional Final Waiver and Release of Liens and Claims upon Final Payment shall accompany Subcontractor's final invoice.

EXHIBIT C.1

INTERIM WAIVER AND RELEASE OF LIENS AND CLAIMS UPON PAYMENT

(To be provided by Subcontractor with Interim Progress Payment Invoices)

STATE OF Massachusetts
COUNTY OF Bristol

The undersigned, Subcontractor ("Subcontractor"), has been engaged under subcontract with Veolia Water North America - Northeast, LLC ("Company") to furnish certain materials, equipment, services, and/or labor for the project known as Taunton MA, 2023 Pump Station Improvements, which is located at Multiple location within the City of Taunton, MA ("Property"), and more particularly described as follows: Taunton MA, 2023 Pump Station Improvements.

Upon receipt of the sum of \$ _____, the Subcontractor waives and releases any and all liens or claims of liens and all claims, demands, actions, causes of action or other rights against Company and the Client and upon the foregoing described Project and Property through the date of _____, 20__ ("Current Date") and reserving those rights and liens that the Subcontractor might have in any retained amounts, on account of materials, equipment, services and/or labor furnished by the undersigned to or on account of Company for said **Taunton MA, 2023 Pump Station Improvements**. Exceptions as follows:

(if no exception entry or "none" is entered above, Subcontractor shall be deemed not to have reserved any claim.)

Subcontractor further represents that all employees, laborers, materialmen, sub-subcontractors and sub-subconsultants employed by the Subcontractor in connection with the Project and all bills incurred through the Current Date for materials, equipment, services and/or labor, and taxes furnished by such parties to the Subcontractor in connection with the Subcontractor's work on the Project have been, or shall be within 10 days of receipt of payment from Company stated above, fully paid and that no obligations, legal, equitable or otherwise, are, or shall be then, owed by the Subcontractor to such parties.

This Waiver and Release is freely and voluntarily given and the undersigned acknowledges and represents that it has fully reviewed the terms and conditions of this Waiver and Release, that it is fully informed with respect to the legal effect of this Waiver and Release, and that it has voluntarily chosen to accept the terms and conditions of this Waiver and Release in return for the payment recited above.

The undersigned understands that the failure to complete correctly or fully any of the blank spaces in this document shall not invalidate the document so long as the subject matter of this Waiver and Release may reasonably be determined.

FOR SUBCONTRACTOR:

Applicable to Payment Request(s) No. _____
(or) Invoice(s) No. _____ By: _____
Date: _____ Title: _____

AFFIDAVIT

On this ____ day of _____, 20__, before me appeared the above-signed, known or identified to me personally, who, being first duly sworn, did say that s/he is the authorized representative of the above-referenced Subcontractor and that this document was signed under oath personally and on behalf of the Subcontractor and the above-signed acknowledged that this Affidavit was executed as a free act and deed of Subcontractor.

Signature _____ (Seal)
Signature of Notary Public

EXHIBIT C.2

UNCONDITIONAL FINAL WAIVER AND RELEASE OF LIENS AND CLAIMS UPON FINAL PAYMENT

(To be provided by Subcontractor with Final Invoice)

STATE OF Massachusetts

COUNTY OF Bristol

The undersigned, Subcontractor ("Subcontractor"), has, under an agreement with Veolia Water North America - Northeast, LLC ("Company"), furnished certain materials, equipment, services, and/or labor for the project known as Taunton MA, 2023 Pump Station Improvements, which is located at Multiple locations within the City of Taunton, MA, County of Bristol ("Property"), and more particularly described as follows: Taunton MA, 2023 Pump Station Improvements.

Upon receipt of the sum of \$_____, such receipt being hereby acknowledged, the Subcontractor waives and releases any and all claims, demands, actions, causes of action or other rights against Company, the Client, the Project and Property, at law, in contract, tort, equity or otherwise, and any and all liens or claims of liens or any right against any labor and/or material bond Subcontractor has, may have had or may have in the future arising out of Subcontractor's performance of work on the Project.

This Waiver and Release applies to all facts, acts, events, circumstances, changes, constructive or actual delays, accelerations, extra work, disruptions, interferences and the like which have occurred, or may be claimed to have occurred prior to the date of this Waiver and Release, whether or not known to the Subcontractor at the time of execution of this Waiver and Release.

The Subcontractor further represents that all of its obligations, legal, equitable, or otherwise, relating to or arising out of its work on the Project have been, or shall be within 10 days of the date stated below, fully satisfied, including, but not limited to obligations relating to:

- Employees, laborers, materialmen, sub-subcontractors and sub-subcontractors employed by the Subcontractor;
- Labor, materials, equipment and supplies furnished by others to the Subcontractor; and
- Sales and use taxes, social security taxes, income tax withholding, unemployment insurance, privilege taxes, license fees, and any other taxes and obligations imposed by governmental authorities.

This Waiver and Release is freely and voluntarily given and the Subcontractor acknowledges and represents that it has fully reviewed the terms and conditions of this Waiver and Release, that it is fully informed with respect to the legal effect of this Waiver and Release, and that it has voluntarily chosen to accept the terms and conditions of this Waiver and Release in return for the payment recited above. The Subcontractor understands, agrees and acknowledges that, upon payment; this document waives rights unconditionally and is fully enforceable to extinguish all claims of the Subcontractor as of the date of execution of this document by the Subcontractor. The Subcontractor understands that the failure to complete correctly any of the blank spaces in this document shall not invalidate the document so long as the subject matter of this Waiver and Release may reasonably be determined.

FOR SUBCONTRACTOR:

Applicable to Payment Request(s) No. _____

Signed: _____(SEAL)

*If all, print "all" _____

By: _____

Date: _____

Title: _____

AFFIDAVIT

On this ___ day of _____, 20___, before me appeared the above-signed, known or identified to me personally, who, being first duly sworn, did say that s/he is the authorized representative of the above-referenced Subcontractor and that this document was signed under oath personally and on behalf of the Subcontractor and the above-signed acknowledged that this Affidavit was executed as a free act and deed of Subcontractor.

Signature _____ (Seal)

Signature of Notary Public

EXHIBIT D

INSURANCE REQUIREMENTS

Without in any way limiting Subcontractor's liability hereunder, Subcontractor shall maintain the following minimum limits of insurance at its own expense during the performance of the Work, with insurance companies rated A-VII or higher by A.M. Best's, to cover the risk of losses associated with this Agreement:

<u>Coverage</u>	<u>Limits</u>
(i) Workers' Compensation	\$100,000
(ii) Employers' Liability	\$1,000,000 each accident \$1,000,000 each employee \$1,000,000 policy limit
(iii) Commercial General Liability written on ISO CG 00 01 coverage form or its equivalent. No limiting or exclusionary endorsements material to Subcontractor's obligations in this Subcontract may be attached. Coverage shall include: a) contractual liability; b) explosion, collapse & underground perils (XCU); c) third-party over action coverage; d) Riggers Liability endorsement for the use of cranes, booms or other rigging equipment, if applicable; and e) amendment of the aircraft exclusion to include coverage for the use of commercial UAVs (drones), if applicable	\$2,000,000 each occurrence for property damage and bodily injury (PD/BI) \$2,000,000 general aggregate per project \$2,000,000 products/completed operations aggregate
(iv) Automobile Liability - covering all owned (if any), hired and non-owned autos. If Subcontractor is performing any hauling, endorsements MCS-90 and/or CA 99 48 shall be attached.	\$2,000,000 combined single limits - each accident
(v) Umbrella/Excess Liability providing coverage at least as broad as the underlying policy(ies)	May be utilized to meet limits outlined above
(vi) Property	Subcontractor shall be solely responsible for protecting and insuring all property owned or leased or used by Subcontractor in conjunction with the Work during the term of this Subcontract
(vii) Professional Liability (Errors & Omissions), if applicable to the Work - Coverage shall not exclude Technology Errors & Omissions coverage if Subcontractor will have any type of access to any Company systems, including, but not limited to, any Company-owned or managed IT asset (network, server or application) wherever it is hosted	\$1,000,000 each claim \$1,000,000 annual aggregate
(viii) Contractor's Pollution Liability, if applicable to the Work	\$1,000,000 each claim \$1,000,000 annual aggregate

Prior to providing any Work under this Agreement, Subcontractor will provide Company with an ACORD certificate of insurance evidencing that the above described coverages are in full force and effect. Subcontractor will name Company and Client as additional insured with respect to coverages (iii), (iv), and (viii), (and (v) if applicable) above. All policies will be primary and non-contributory, provide a full waiver of the insurer's right of subrogation in favor of Company and Client, if applicable, and/or any sub-subcontractor with respect to claims that are covered or should have been covered by valid and collectible insurance provided hereunder and said waiver will extend to any deductibles, co-insurance or (2023 PS Imp.) - 5/26/2023

retentions. Subcontractor will not permit any cancellation or non-renewal in the insurance coverage to be provided hereunder without thirty (30) days' written notice to Company.

All policies shall be issued on occurrence-based forms, except for coverages (vii) or (viii), which may be issued on a claims-made form. All claims-made policies will at least be retroactive to the earlier of the date of this Agreement or the commencement of Subcontractor's services in relation to the Work, and shall be maintained for three (3) years after the expiration or termination of this Agreement.

These insurance requirements will not be construed in any matter as waiving, restricting or limiting Company's rights or Subcontractor's obligations under this Agreement. Company does not represent that coverage or limits herein will be adequate to protect Subcontractor. Subcontractor remains responsible for any liability not paid by insurance including deductibles and retentions.

EXHIBIT E
INSURANCE SUPPLEMENT (IF APPLICABLE)
INTENTIONALLY LEFT BLANK

EXHIBIT F
ADDITIONAL / SPECIAL TERMS
INTENTIONALLY LEFT BLANK

EXHIBIT G

TERMS AND CONDITIONS FOR SERVICES INVOLVING HAZARDOUS OR CONTAMINATED NON-HAZARDOUS WASTE OR MATERIALS

1. DEFINITIONS

- 1.1. "Hazardous Waste or Hazardous Materials": Means any substance falling within the definition of hazardous waste or hazardous material as set forth in the United States Resource Conservation and Recovery Act, 42 U.S.C §6901 et seq., the United States Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C §9601 et seq., or any other federal, state or local statutes, regulations and ordinances which are applicable to the handling, remediation or transportation of Hazardous Waste or Hazardous Materials.
- 1.2. "Non-Hazardous Contaminated Materials": Means any material considered contaminated by State or Federal law or regulation but is not listed under RCRA and are able to pass TCLP, e g, oil contaminated materials.
- 1.3. "Law" or "Laws": Means all federal, state and local statutes, laws, ordinances and any regulations, orders and administrative guidelines (by whatever title, and without respect to whether enforceable at law) issued thereunder that are applicable to the performance of the Work under this Agreement. To the extent that a Permit is required for Subcontractor to perform the Work, "Law" includes "Permit."
- 1.4. "Permit" or "Permits": Means every permit, license, authorization, certification, permission, or equivalent control document required under any federal, state or local statute, law ordinance, regulation or order.

2. WARRANTY

- 2.1. Subcontractor warrants that it is aware of and is knowledgeable about all Laws, including Environmental Protection Agency (EPA) Regulations, U.S. Department of Transportation (DOT) Regulations, the Occupational Safety and Health Act (OSHA) Regulations and the Resource Conservation and Recovery Act (RCRA), which may be applicable to the handling, remediation, disposal or transportation of Non-Hazardous Contaminated Materials, Hazardous Waste or Hazardous Materials which comprise all or part of the Work under this Agreement. Subcontractor further warrants that the Work will be accomplished in a manner which complies with Laws including, but not limited to, EPA DOT, OSHA and RCRA.
- 2.2. Subcontractor warrants that it is fully aware of the extent of the Work required by this Agreement, that it has conducted adequate research and analysis with respect to the handling, remediation, disposal and/or transportation of Non-Hazardous Contaminated Materials, Hazardous Waste or Hazardous Materials which comprise all or part of the Work under this Agreement, and that it has the expertise, experience, personnel, equipment (including the necessary health and safety personal protective equipment), facilities and financial resources necessary to perform the Work in accordance with all Laws.
- 2.3. Subcontractor warrants that it possesses or shall obtain, prior to commencing the Work, all Permits and other forms of documentation required in order to perform the Work in full compliance with all Laws, and shall ensure that all of the Subcontractor's employees, and all sub-subcontractors and their employees at any tier shall also possess the necessary Permits, and other forms of required documentation prior to the commencement of the Work.
- 2.4. If Work requires the generation of a Site-Specific Safety and Health Plan (SSHP) as required by OSHA, the Subcontractor and its sub-subcontractors shall generate such a plan for their employees in compliance with 29 CFR 19101.20/1926.65. This plan shall be made available to Company prior

to the start of any field activities. The Subcontractor's SSHP is solely the responsibility of Subcontractor, who shall evaluate the potential hazards to its employees and adhere to its SSHP. The Subcontractor's SSHP shall, at a minimum, conform to the requirements, where applicable, established in Company SSHP if one is generated. However, the Company SSHP does not, nor is it intended to, address procedures or activities of Subcontractor or its sub-subcontractors.

2.5. Subcontractor warrants that it is aware of and understands the currently known hazards and risk of injury to persons, property and the environment associated with the handling, remediation, disposal and/or transportation of Non-Hazardous Contaminated Materials, Hazardous Waste or Hazardous Materials which comprise all or part of the Work, Subcontractor shall have instructed its employees and the employees of its sub-subcontractors at any tier in the proper safety procedures and safety equipment to be used in the performance of the Work in compliance with all Laws, including OSHA.

3. TRANSPORTING WASTES OFF-SITE

3.1. Any vehicles/waste shipment containers leaving an exclusion zone shall be decontaminated prior to leaving the Project Site. The Subcontractor shall inspect all waste shipment containers prior to leaving the Project Site to ensure that the least possible amount of soil adheres to wheels and undercarriages.

3.2. Subcontractor shall not deliver site materials to any facility other than the approved disposal facility(ies) listed on the shipping manifest.

3.3. Subcontractor shall be responsible for and all actions necessary to remedy situations involving transit of mud, soil, contaminates, or waste materials trucked offsite. This cleanup shall be accomplished at the Subcontractor's expense.

3.4. Subcontractor shall prepare and submit for approval by Client through Company, a route selection report containing results of any inspections of the proposed access routes to determine road conditions, overhead clearance, weight restrictions, and required traffic control measures.

3.5. The Subcontractor shall ensure that waste shipment containers are protected against contamination by properly covering and lining them with compatible materials or by decontaminating them prior to any use other than hauling contaminated materials.

3.6. Prior to leaving the Project Site, a load inspection of all shipments shall be conducted by a designated responsible party approved by Company's Designated Representative. The load inspection report shall be submitted to Client through Company, which shall verify and provide written documentation of the following:

- A complete and accurate manifest.
- Utilization of the proper DOT approved shipping container in accordance with 49 Code of Federal Regulation (CFR).
- Labeling in accordance with DOT regulations specified by 49 CFR.
- A bill of lading traceable to the manifest.
- Validation that all waste shipment containers are in good condition and are not leaking.
- A statement that the driver is physically fit to perform his duties.
- Validation that the driver has written documentation in his possession of completion of the required DOT safety training and health monitoring.
- A statement that the driver's log book is current.
- Validation that a certificate of insurance is in force.

3.7. Site materials will be stored and transported in bulk containers when practical.

4. NOTIFICATION OF RELEASE

4.1. The Subcontractor shall be prepared and qualified to respond to emergency situations and releases for operations under the Subcontractor's control.

4.2. Should any release of Non-Hazardous Contaminated Materials, Hazardous Waste or Hazardous Materials occur during the performance of the Work, Subcontractor shall immediately notify all appropriate agencies and take all appropriate action. The Subcontractor shall also notify Company of such release by telephone or facsimile within four (4) hours of the incident. Subcontractor shall provide Company with copies of all notices of the release provided to any person, agency or authority by Subcontractor or its agents. Such copies shall be provided to Company simultaneously with the service of the original to any person, agency or authority.

EXHIBIT H

IT Security Requirements

At all times during its performance of work arising under this Agreement, Subcontractor shall comply with (and ensure that its managers/members, employees, agents and representatives of any type comply with) all requirements and policies of Veolia or its customers concerning information security, safety and other business operations, and all applicable Federal, foreign, state and local laws, rules, ordinances, codes and regulations including, but not limited to, all laws regulating the conduct of Works.

CONFIDENTIAL INFORMATION

At the expiration or termination of this Agreement, Subcontractor shall return or destroy (if requested by Company) all copies, extracts or other reproductions in whole or in part of the Confidential Information disclosed to the Subcontractor by Company. If Company requests that the documents be destroyed, Subcontractor shall provide a certification of such destruction, by an officer of Subcontractor. Subcontractor shall retain no copies of any Confidential Information.

NOTICES

Subcontractor is required to provide notification to Company of any suspected or actual breach of security, intrusion or unauthorized use or disclosure of Company personally identifiable information or Confidential Information and/or any actual or suspected use or disclosure of data in violation of any applicable federal or state laws or regulations in connection with the services and/or deliverables contained within this Agreement. In addition to sending notification to the General Counsel, notification shall also be sent to: na.information.security@veolia.com

WARRANTIES

Subcontractor warrants that it will maintain commercially reasonable security standards for its and its end users' systems, including without limitation the use of sufficiently secure passwords and regularly required password change, maintain its systems with proper patching and security updates; will use good industry virus protection software and practices, and other security best practice procedures to protect Company data and to avoid introducing any virus that could disrupt the proper operation of the Company systems used or corrupt the data.

Subcontractor also warrants that it shall use all reasonable endeavors to ensure that its end users do not upload or distribute files that contain viruses, malicious files or other harmful code on to, or disrupt or attempt to disrupt the systems and networks used during the Works. In the event a virus or other such code is introduced into the Company systems due to Subcontractor's failure to use such endeavors or Company data is breached from Subcontractor's systems, Subcontractor will at its cost assist Company in mitigating the direct effects of such issue.

VIRUSES

Subcontractor warrants it has not knowingly included any known viruses (including, but not limited to Trojan horses, or worms, or other software code designed to permit unauthorized access to, or to erase or otherwise harm, Company software, hardware, or data) with any material provided to Company.

OWNERSHIP OF DATA

Company will at all times retain ownership in the data, proprietary information and materials that Company provides to Subcontractor, including all patent, copyright and other intellectual property rights of Company, and all materials prepared by Subcontractor pursuant to this Agreement, including but not limited to surveys, results and findings.

EXHIBIT I

ANTI-CORRUPTION COMPLIANCE

1. In carrying out the terms of this Agreement, Subcontractor hereby undertakes to strictly comply with applicable laws prohibiting the bribery of public officials and private persons, influence peddling, money laundering that may in particular entail a public contract debarment, including:
 - (a) the 1977 Foreign Corrupt Practices Act of the United States,
 - (b) the 1999 Canadian Corruption of Foreign Public Officials Act,
 - (c) the 2010 UK Bribery Act, the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions of December 17, 1997. SUBCONTRACTOR undertakes to put in place and implement all necessary and reasonable policies and measures to prevent corruption.
2. Subcontractor declares that to its knowledge, its legal representatives, directors, employees, agents, and anyone performing services for or on behalf of Company pursuant to this Agreement do not and will not directly or indirectly offer, give, agree to give, authorize, solicit, or accept the giving of money or anything else of value or grant any advantage or gift to any person, company or undertaking whatsoever including any government official or employee, political party official, candidate for political office, person holding a legislative, administrative or judicial position of any kind for or on behalf of any country, public agency or state owned company, official of a public international organization, for the purpose of corruptly influencing such person in their official capacity, or for the purpose of rewarding or inducing the improper performance of a relevant function or activity by any person in order to obtain or retain any business for Company or to gain any advantage in the conduct of business for Company.
3. Subcontractor further undertakes to ensure that neither Subcontractor nor any of its legal representatives, directors, employees, agents, sub-contractors and anyone performing services for or on behalf of Company under this Agreement has been, or is listed by any government agency as being debarred, suspended, proposed for suspension or debarment, or otherwise ineligible for participation in government procurement programs and/or bidding following invitations to bid advertised by the World Bank or any other international development bank.
4. Subcontractor undertakes to retain for an appropriate period following termination of this Agreement, accurate supporting documentation of its compliance with the terms of this clause.
5. Subcontractor agrees to notify Company of any breach of any term of this clause within a reasonable time.
6. If Company notifies Subcontractor that it has reasonable grounds to believe that Subcontractor has breached any term of this clause:
 - (a) Company is entitled to suspend performance of this Agreement without notice for as long as Company considers necessary to investigate the relevant conduct without incurring any liability or obligation to Subcontractor for such suspension;
 - (b) Subcontractor is obliged to take all reasonable steps to prevent the loss or destruction of any documentary evidence in relation to the relevant conduct.
7. If Subcontractor breaches any term of this clause:
 - (a) Company may immediately terminate this Agreement without notice and without incurring any liability.
 - (b) Subcontractor undertakes to indemnify Company, to the maximum extent permitted by law, for any loss, damages, or expenses incurred or suffered by Company arising out of such breach.

EXHIBIT J

BONDING / LETTER OF CREDIT REQUIREMENTS

Effective on the date this Contract is entered into the Subcontractor shall provide financial security for the performance of its obligations hereunder through a Performance Bond issued by a surety company: (1) approved by the Owner having a rating of "A" in the latest revision of the A.M. Best Company's Insurance Report; (2) listed in the United States Treasury Department's Circular 570, "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsurance Companies"; and (3) properly registered and licensed to conduct business in the State of Connecticut. The bond shall be issued in the name of the Subcontractor, as principal, and the Company and Client, as obligee, in the full amount (100%) of the Work, to be adjusted to account for any adjustments, and shall remain open until the final completion of the Work and any modifications.

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SECTION 00700

GENERAL CONDITIONS

- 1.01 General Provisions with each particular duty, obligation, right and remedy to which they apply.
- 1.02 Definitions
- 1.03 Materials and Equipment
- A. General
 - B. American Iron & Steel Requirements
 - C. Handling
 - D. Storage of Excavated Material
 - E. Inspection
 - F. Inspection Away from Site
 - G. Samples
 - H. Shop testing
- 1.04 Contractor's Shop and Working Drawings
- 1.05 Occupying Private Land
- 1.06 Interference with and Protection of Streets
- 1.07 Safety
- 1.08 Existing Facilities
- A. Dimensions of Existing Structures
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- 1.17 Additional or Substitute Bonds
- 1.18 Separate Contracts
- 1.19 Payrolls of Contractor and Subcontractors
- 1.20 Payments by Contractor
- 1.21 "Dig Safe" Law
- 1.22 Fire Prevention and Protection
- 1.23 Dust Control
- 1.24 Disposal of Debris
- 1.25 Night, Saturday, Sunday and Holiday Work
- 1.26 Length of Work Day
- 1.27 Hurricane Protection
- 1.28 Reduction in Scope of Work
- 1.29 Equal Employment Opportunity
- 1.30 Unlawful conduct and Participation in Boycott

B. Sections of Division 1, General Requirements govern the execution of the Work of all sections of the specifications.

C. The Specifications are written in imperative and streamlined form. This imperative language is directed to the Contractor, unless stated otherwise.

1.02 DEFINITIONS

A. Wherever the words as listed in subsection 1.01 of the AGREEMENT or pronouns used in their stead occur in the Contract Documents, they shall have the meanings as given in the AGREEMENT.

1.03 MATERIALS AND EQUIPMENT

A. General

1. Unless otherwise provided in the Contract Documents, only new materials and equipment shall be incorporated in the Work.

2. As soon as possible after execution of the AGREEMENT, submit to the Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment proposed to be incorporated into the Work.

3. When shop and working drawings are required as specified below, submit, prior to the submission of such drawings, data in sufficient detail to enable the Engineer to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications.

4. Submit data relating to the materials and equipment proposed to be incorporated into the Work in sufficient detail to enable the Engineer to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

B. American Iron and Steel Requirements

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

1.01 GENERAL PROVISIONS

A. The duties and obligations imposed by these General Conditions will be as effective as if repeated specifically in the Contract Documents in connection

Appendix I) are included in the specifications in 1067-Appendix I.

2. This project is subject to the American Iron and Steel and the Build America, Buy America Act (BABA). The amendments to the Clean Water Act, as part of WRRDA, apply the American Iron and Steel (AIS) requirements to all treatment work projects. Furthermore, BIL extends this procurement requirement to all SRF construction projects going forward with the inclusion of the Build America, Buy America Act (BABA). Starting on May 14, 2022, all steel, iron, manufactured products, non-ferrous metals, plastic and polymer-based products (including polyvinylchloride, composite building materials and polymers used in fiber optic cables), glass (including optic glass), lumber, and drywall used in infrastructure projects for federal financial assistance programs must be produced in the United States. MassDEP ensures that the required procurement language is included in contracts and conducts field verifications of project compliance

3. **The BABA requirements are waived for this Project** based on EPA's Decision Memorandum titled Adjustment Period Waiver of Section 70914(a) of P.L. 117-58, Build America, Buy America Act for SRF Projects that have Initiated Design Planning issued September 2, 2022.

C. Handling

1. Handle, haul, and distribute materials and all surplus materials on the different portions of the Work, required to complete the Work in accordance with the Contract Documents.

2. Provide suitable storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished under this Contract, until the final completion and acceptance of the Work.

3. Pay all storage and demurrage charges by transportation companies and vendors.

D. Storage of Excavated Material

1. Place excavated materials and equipment to be incorporated in the Work so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work.

2. Materials shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

E. Inspection

1. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer.

2. No material shall be processed or fabricated for the Work or delivered to the work site without prior concurrence of the Engineer.

3. Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor.

4. Defective materials and equipment shall be removed immediately from the site of the Work.

F. Inspection away from Site

1. If work to be done, away from the construction site, is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and delivered to the Engineer in ample time, as determined solely by the Engineer, so that the necessary arrangements for the inspection can be made.

G. Samples

1. Submit samples of materials for tests, as the Engineer deems necessary to demonstrate conformance with the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed by the Engineer.

2. Furnish suitable molds for making concrete test cylinders. Except as otherwise expressly specified, the Owner shall make arrangements for, and pay for, the tests.

3. Pack samples so as to reach their destination in good condition, and label to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, notify the Engineer by letter that the samples have been shipped and properly describe the samples in the letter. Send letter of notification separate from the samples.

4. Submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences for failure to do so shall be the Contractor's sole responsibility.

5. In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., provide such samples of workmanship of wall, floor, finish, etc., as may be required.

6. After review of the samples, data, etc. the materials and equipment used for the Work shall in all respects conform therewith.

H. Shop Testing

1. When required, furnish to the Engineer in triplicate, sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

1.04 CONTRACTOR'S SHOP AND WORKING DRAWINGS

A. Submit shop drawings to the Engineer for review and approval.

B. All submittals will be identified as the Engineer may require and in the number of copies also as required by the Engineer.

C. The data shown on the Shop Drawings will be complete regarding quantities, dimensions, specified performance and design criteria, materials and other data as particular to the Work that the Contractor proposes to provide.

1.05 OCCUPYING PRIVATE LAND

A. Entering or occupying with men, tools, materials, or equipment, any land outside the rights-of-way or property of the Owner (except after written consent from the proper parties) will not be permitted. A copy of the written consent shall be given to the Engineer.

1.06 INTERFERENCE WITH AND PROTECTION OF STREETS

A. Obtain permits from the governing authorities prior to obstructing any portion of a street, road, or private way. If any street, road or private way is rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as ordered by the governing authorities.

B. Maintain streets, roads, private ways, and walks not closed in a passable and safe condition, in accordance with all state and local laws, and all requirements of the Americans with Disabilities Act (ADA). **See Attachment A to this Specification**

C. Provide at least 24 hours in advance, notice to the Owner, Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. Cooperate with all Departments in the establishment of alternate routes and provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

1.07 SAFETY

A. Take all precautions and provide safeguards to prevent personal injury and property damage. Provide protection for all persons including but not limited to employees and employees of other contractors and subcontractors; members of the public; and employees, agents and representatives of the Owner, the Engineer, and regulatory agencies that may be on or about the Work. Provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

B. Provide and maintain all safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment.

C. Comply with all applicable Federal, State and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

D. Designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

1.08 EXISTING FACILITIES

A. Dimensions of Existing Structures

1. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

B. Proposed Pipe Location

1. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's

convenience and does not relieve him for laying and jointing different or additional items where required.

2. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access way, and, in general, without diagonal runs.

C. Interference with Existing Works

1. Conduct operations so as to interfere as little as possible with existing works. Develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest time when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. Electrical connections should be coordinated with the Owner so as to minimize disruption of normal plant operations. Before starting work which will interfere with the operation of existing facilities, perform preparatory work and see that all tools, materials and equipment are made ready and at hand.

2. Repair utilities damaged by the Contractors operations during the progress of the work, and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Owner. Contact the proper utility or authority to correct or make any changes due to utility or other obstructions during the work but the entire responsibility and expense shall be with the Contractor.

3. Make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

4. Submit no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous flow of sewage.

D. Existing Utilities or Connections

1. The location of existing underground pipes, conduits, and structures, as shown, has been collected from the best available sources. The Owner, together with its agents, does not imply nor guarantee the data and information in connection with underground

pipes, conduits, structures and such other parts as to their completeness, nor their locations as indicated. The Contractor shall assume that there are existing water, sewer, gas and other utility connections to each and every building enroute, whether they appear on the drawings or not. An expense and/or delay occasioned by utilities and structures, or damage thereof, including those not shown, shall be the responsibility of the Contractor, at no additional expense to the Owner.

2. Above ground utilities may be present in the areas of the proposed Work. Take all necessary actions and/or precautions, including, but not limited to, utility company notification and necessary relocations (both temporary and permanent), to insure proper protection of those aboveground utilities and appurtenances to be affected by his operations. All costs associated with the aboveground utilities shall be paid by the Contractor at no additional expense to the Owner.

3. If and when encountered, existing utilities shall be properly supported and protected during the construction work and the Engineer shall be notified accordingly. The operation of existing utilities shall not be interrupted except with written permission of the operator and owner of such utilities. Allow ample time for all measures as may be required for the continuance of existing utility operations. Take extreme precautions to minimize disruption of utilities. Make prompt and full restitution for repairs by others for all disruptions caused by operations required to perform the Work.

4. Comply with all requirements of utility organizations involved.

E. Failure to Repair

1. Any emergency arising from the interruption of electric, telephone, gas, water, or sewer service due to the activities of the Contractor, shall be repaired by the Contractor as quickly as is possible.

2. If and when, in the opinion of the Owner, the Contractor is not initiating repair work as expeditiously as possible upon notification to do so, the Owner, may at his own option, make the necessary repairs using his own forces or those of others. The cost of such repairs shall be subtracted from the payments due to the Contractor.

F. Disturbance of Bounds

1. Replace all bounds disturbed during the construction operation, at no additional cost to the Owner. The bounds shall be relocated by a land surveyor approved by the Engineer and registered in the State that the Work is to be done.

1.09 WORK TO CONFORM

A. During its progress and on its completion, the Work shall conform to the lines, levels, and grades indicated on the Drawings or given by the Engineer and shall be built in strict accordance with the Contract Documents and the directions given from time to time by the Engineer.

B. All work done without instructions having been given therefore by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

1.10 PLANNING AND PROGRESS SCHEDULES

A. Before starting the Work and from time to time during its progress, as the Engineer may request, the Contractor shall submit to the Engineer a written description of the methods he plans to use in doing the Work and the various steps he intends to take.

B. Within 14 calendar days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Engineer (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

1.11 PRECAUTIONS DURING ADVERSE WEATHER

A. During adverse weather and against the possibility thereof, take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required by the manufacturer of the material or equipment to be installed, 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 that will result in a moist or 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.

1.12 TEMPORARY HEAT

A. If temporary heat is required for the protection of the Work, provide and install suitable heating apparatus, provide adequate and proper fuel, and shall maintain heat as required.

B. Temporary heating apparatus shall be installed and operated in such manner that finished work will not be damaged.

1.13 ELECTRICAL ENERGY

A. Make all necessary applications and arrangements and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work and during its entire progress. Provide and pay for all temporary wiring, switches, connections, and meters.

B. Provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

1.14 CERTIFICATES OF CONFORMANCE

A. Furnish to the Engineer, in the manner as directed and prior to actual installation, notarized certificates of conformance for all materials to be furnished under this Contract. The notarized certificates of conformance shall state that the material to be furnished meets or exceeds all requirements specified under the Contract Documents. When so directed, the manufacturer's notarized certificates of conformance, certifying that the materials meet the requirements specified shall accompany each shipment of material. Unless otherwise specifically specified and/or directed by the Engineer, all testing of materials required under this Contract shall be provided by the Contractor at no additional expense to the Owner.

1.15 PATENTS

A. Pay, at no additional expense to the Owner, all applicable royalties and license fees associated with the materials and construction methods to be used under this Contract. Defend all suits or claims for infringements of any patent rights, and save the Owner and Engineer harmless from loss on account thereof, except that the Owner shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer (s) is specifically specified with no option to the Contractor. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a

patent, he shall be responsible for such loss unless he promptly gives such information to the Owner.

B. Refer to Specification Section 1.07, Patents, regarding the Contractor's responsibilities for any patent rights associated with the materials and construction methods to be used under this Contract.

1.16 "OR EQUAL" CLAUSE

A. Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product of a particular manufacturer or vendor, any material or article which will perform adequately, in the Engineer's sole judgment and/or opinion, the duties imposed by the general design may be considered equal and satisfactory providing the material or article so proposed is of equal substance. It shall not be purchased or installed without his written approval. In all cases new material shall be used in the project.

B. If more than one brand, name of material, device, or piece of equipment is shown or specified, each should be regarded as the equal of the other. Any other brand, make of material, device or equipment, which in the opinion of the OWNER and/or ENGINEER, is the recognized equal of that specified (considering quality, workmanship, and economy of operation), and is suitable for the purpose intended, may be accepted.

C. ENGINEER will be allowed a reasonable time within which to evaluate submittals for Substitute Items. ENGINEER will be the sole judge of acceptability. No "Or Equal" or Substitute Item will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitutes proposed or submitted by CONTRACTOR and in making changes to the Contract Documents. Whether or not ENGINEER accepts a Substitute Item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed Substitute Item.

1.17 ADDITIONAL OR SUBSTITUTE BONDS

A. If at any time the Owner, for justifiable cause, shall be or become dissatisfied with any Surety or Sureties than upon the performance or payment bonds,

the Contractor shall, within five (5) calendar days after notice from the Owner so to do, substitute an acceptable bond (or bonds) in such form and sum and signed by such other Surety or Sureties as may be acceptable to the Owner. The Contractor shall pay the premiums on such bonds with no additional expense to the Owner. No further payments shall be deemed due nor will be made until the new Surety or Sureties shall have furnished such as acceptable bond to the Owner.

1.18 SEPARATE CONTRACTS

A. The Owner reserves the right to let other contracts in connection with the construction of the contemplated work of this project or contiguous projects of the Owner. The Contractor, therefore, will afford any such other contractors reasonable opportunity for the introductions and storage of their materials and the execution of their work, will properly connect and coordinate his work with theirs, and will not commit or permit any act which will interfere with the performance of their work.

B. Coordinate operations with those of other contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work.

C. It is essential that all parties interested in the project cooperate to the end that the entire project will be brought to a successful conclusion as rapidly as possible, but the Owner cannot guarantee that no interference or delay will be caused thereby. Interference and delay resulting from such cooperation shall not be basis of claims against the Owner.

1.19 PAYROLLS OF CONTRACTOR AND SUBCONTRACTORS

A. The Contractor and each of his Subcontractors shall prepare his payrolls on forms prescribed and in accordance with instructions to be furnished by the Owner. Within seven (7) days after the regular payment date of the payroll, the Contractor shall deliver to the Owner, with copies to the Engineer, a certified legible copy or copies of each such payroll. Each such payroll shall contain the statement required by the Federal Regulations issued pursuant to the "Anti-Kickback Statute", (48 Stat. 948; 18 U.S.C. 874; 40 U.S.C. 276C).

B. Carrying any person on his payrolls not employed by him will not be permitted. Carrying employees of a subcontractor on his payrolls will not be permitted, but such employees must be carried on the payrolls of the employing subcontractor.

C. Each Contractor or Subcontractor shall preserve his weekly payroll records for a period of three (3) years from the date of completion of the Contract. The payroll records shall set out accurately and completely the name, occupational classification, and hourly wage rate of each employee, hours worked by him during the payroll period and full weekly wages earned by him, and deductions made from such weekly wages and the actual weekly wage paid to him. Such payroll records shall be made available at all times for inspection by the Owner or his authorized representatives, the Engineer or by agents of the United States Department of Labor.

1.20 PAYMENTS BY CONTRACTOR

A. Pay for all traffic control, safety, transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered. Reimbursable costs for services rendered, as specified in the Contract Documents, shall not be incorporated into partial payment estimates until such time that the Contractor submits to the Engineer actual paid invoices from those in which services were rendered.

1.21 "DIG SAFE" LAW

A. Before proceeding with construction operations, the Contractor shall notify the State of Massachusetts Underground Plant Damage Prevention Systems (DIG SAFE at 1-888-344-7233), and shall make such supplemental investigations, including exploratory excavations, by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures, and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than that shown on the drawings, or which were made known to the Contractor prior to construction operations. The Contractor shall be responsible and liable for all damages to the existing utilities and structures.

1.22 FIRE PREVENTION AND PROTECTION

A. State and municipal rules and regulations with respect to fire prevention, fire-resistant construction and fire protection shall be strictly adhered to and all work and facilities necessary therefore shall be provided and maintained by the Contractor in an approved manner.

B. Provide fire protection equipment such as water tanks, hoses, pumps, extinguishers, and other materials, and apparatus, for the protection of the contract work, and adjacent property. Trained personnel experienced in the operation of all fire protection equipment and apparatus shall be available

on the site whenever work is in progress, and at such other times as may be necessary for the safety of the public and the work.

1.23 DUST CONTROL

A. Exercise every precaution and means to prevent and control dust arising out of all construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Pavements adjoining pipe trench shall be kept clean of excess materials wherever and whenever directed by the Engineer. Repeated daily dust control treatment shall be provided to satisfactorily prevent the spread of dust until permanent pavement repairs are made and until earth stockpiles have been removed, and all construction operations that might cause dust have been completed. No extra payment will be made for dust control measures, compensation shall be considered to be included in the prices stipulated for the appropriate items as listed in the Bid.

1.24 DISPOSAL OF DEBRIS

A. The materials from the demolition, and those used in the construction of the Work throughout the project, shall be deposited in such a manner so as to not endanger persons or the Work, and so that free access may be had at any time to all hydrants, gates and existing equipment in the vicinity of the work. The materials shall be kept trimmed-up so as to be of as little inconvenience as possible to the public travel and plant operations. All excavated materials not approved for backfill and fill, all surplus material, and all rock and boulders resulting from the excavations, shall be removed and satisfactorily disposed of off the site by the Contractor, at no additional expense to the Owner.

B. The materials being removed from the pipelines and manholes during the cleaning process shall be deposited in such a manner as to not endanger the public, plant personnel or persons performing the work. Such debris deposits may be of such nature, high in biological organic contents, or chemically aggressive that they will require proper disposal in a safe, health risk free, environment. Contact the Owner and Engineer and all agencies having jurisdiction thereof, for approval of debris disposal methods and locations of disposal, prior to disposing of any or all debris removed from pipe cleaning methods. All debris shall be removed and satisfactorily disposed of off the work site, at no additional expense to the Owner.

1.25 NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK

A. No work shall be done at night or on Saturdays, or Sundays or holidays without the prior written approval of the Owner and Engineer.

1.26 LENGTH OF WORK DAY

A. The Owner retains the right to restrict the Contractor to an eight-hour workday. Such restrictions shall not be the basis for damages or claims against the Owner.

B. The Contractor's attention is also directed to the fact that should it be deemed necessary to perform various items of work during off-peak flow or traffic hours, early morning or late night hours, then he shall notify the Engineer a minimum of 24 hours in advance as to his intentions and reasons for the change in work hours. The Contractor shall be responsible for properly contacting and informing all involved parties of such a change in work hours. The Contractor shall not be entitled to any additional compensation from the Owner for any expenses that may be incurred by change of working hours and/or scheduling.

1.27 HURRICANE PROTECTION

A. Should hurricane warnings be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work and to adjacent property. These precautions shall include closing all openings; removing all loose materials, tools and/or equipment from exposed locations; and removing or securing scaffolding and other temporary work.

1.28 REDUCTION IN SCOPE OF WORK

A. The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work should the Owner deem it to be in the public interest to do so. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any as set forth in the BID, either prior to executing the contract or at any time during the progress of the work. The Owner further reserves the right, at any time during the progress of the work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

1.29 Equal Employment Opportunity

A. During the performance of this contract, the contractor will not discriminate against any employee

or applicant for employment because of race, color, religion, sex, 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 by the contracting officer setting forth the provisions of this nondiscrimination clause.

B. The contractor will, in all solicitations or advancements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

C. 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 by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

D. The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

E. The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders. Comp., p. 684, EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

F. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive

Order No. 11246 of Sept. 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

G. The contractor will include the provisions of paragraphs A through G 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 No. 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 may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor

END OF SECTION

becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States." [Sec. 202 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966-1970"]

1.30 Unlawful Conduct and Participation In Boycott

A. The Contractor shall not participate in or cooperate with an international boycott, as defined in Section 999 (b) (3) and (4) of the Internal Revenue Code of 1954, as amended, or engage in conduct declared to be unlawful by Section 2 of Chapter 151E of the Massachusetts General Laws

ATTACHMENT A ADA DURING CONSTRUCTION

When traffic control plans are developed by the contractor

The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway and/or public right-of-way, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a temporary traffic control "TTC" zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents. The primary function of TTC is to provide for the reasonably safe and efficient movement of road users through or around TTC zones while reasonably protecting workers, responders to traffic incidents, and equipment.

Temporary facilities, including reasonably safe pedestrian routes around work sites, are also covered by the accessibility requirements of the Americans with Disabilities Act of 1990 (ADA) (Public Law 101-336, 104 Stat.327, July 26, 1990. 42 USC 12101-12213 (as amended)). Implementation of TTC plans and installation and maintenance of devices shall be the responsibility of the contractor performing the construction, alteration and/or maintenance of the highway or public right-of-way. When an existing continuous sidewalk or street crossing route cannot be maintained for pedestrians because of construction, either temporary walkways with curb ramps are to be provided, or the construction shall be phased to maintain access to the affected addresses. **Contractors shall be allowed flexibility as long as the requirements are met.**

The location of the construction project and whether or not accessible facilities are present shall also determine the extent of the needed temporary facilities. **The contractor is only required to maintain practical continuity** where accessible facilities already exist. On low speed rural roads that do not have sidewalks and are used by bicyclists, no additional measures are needed as the bicycles can share the available travel lanes with other traffic. On moderate to higher speed rural roads, if a bike lane exists then it should be properly detoured, complete with signage, to provide a safe route through or around the work area. If a road or bridge project affects vehicular traffic to a business, residence, school or any other type of pedestrian generating location with existing accessible facilities, then pedestrian and handicapped access must be maintained.

A continuous route for all pedestrians, including the disabled and bicyclists, shall be maintained at all times. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. The temporary route should enable pedestrians to bypass the construction site while minimizing the retracing of their steps or going significantly out of their way. Additional consideration must be given to the disabled since they may not have the physical or cognitive ability to improvise (e.g. balancing along the curb or a very narrow path) or use unofficial alternatives (e.g. using an adjacent grass surface). Temporary routes must meet the accessibility guidelines of the ADA for permanent facilities and shall be marked with the proper signage. Should existing crosswalks at signalized intersections be closed or made inaccessible, temporary crosswalks should be painted in an accessible location. Temporary signals should include pedestrian phases.

Contractors shall not block temporary walkways with contractor parking, materials piles, signs, rubble or rubbish. Construction equipment and equipment operation must be separated from the temporary walkways. At work zones where higher volumes of pedestrian traffic or school children exist, pedestrian fences or other protective barriers may be needed to prevent access into the construction area.

Detour and diversion routes, when used for pedestrians and bicyclists, should be evaluated for the following items:

- Direct conflicts between pedestrians and vehicular traffic, work vehicles, and other work activities must be reduced with protective barriers or continuous high contrast fencing (min 36" high with a 6" high toe board). See MUTCD 6F.68 and 6D.02
- Temporary pedestrian facilities should provide safe, accessible routes that replicate as nearly as practical the most desirable characteristics of the existing facility, and parallel the disrupted route whenever possible. A smooth, continuous hard surface should be provided throughout the entire length of the temporary pedestrian facility. There should be no curbs or abrupt changes in grade or terrain that could cause tripping or be a barrier to wheelchair use. The geometry and alignment of the facility should meet the applicable requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) for Buildings and Facilities. See MUTCD 6D.01 and 6D.02
- Advance information placed at appropriate distances before the work zone allowing pedestrians to make timely decisions about routes through or around the work zone. See MUTCD 6F.13
- Transition information allowing pedestrians to find a safe path through and around work zones, which is critical when the pathway is restricted, diverted or detoured. See MUTCD 6F.13
- Work area information assisting in safe passage of pedestrians through the work zone. This information is needed on all pedestrian routes except detours. See MUTCD 6F.13
- Exit information directing pedestrians back to the original route. See MUTCD 6F.13
- Crosswalk placement at intersections may need additional signage, temporary striping, traffic signal modification, pedestrian signals with audible alarms if justified, proper push button height, and ramps. See MUTCD 6H.29, 6F.80, and 4E.06
- Accommodations for other transit forms (busses, trains etc.) are made. See MUTCD 6D.02
- Requirements of the ADAAG and MUTCD are adhered to.
- Access is maintained to the affected businesses and residences.

Frequent checks of the pedestrian and bicycle accommodations are made during construction to ensure that the temporary traffic control plan is followed, traffic control devices are maintained in good condition, and safe, accessible pedestrian and bicycle routes are available at all times.

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SECTION 00800

SUPPLEMENTARY CONDITIONS

- 1.01 General
- 1.02 Limits of Normal Excavation
- 1.03 Bolts, Anchor Bolts, and Nuts
- 1.04 Concrete Inserts
- 1.05 Sleeves
- 1.06 Cutting and Patching
- 1.07 Foundations, Installations and Grouting
- 1.08 Services of Manufacturer's Representative
- 1.09 Operating Instructions and Parts List
- 1.10 Lubricants
- 1.11 Special Tools
- 1.12 Equipment Drive Guards
- 1.13 Protection Against Electrolysis
- 1.14 Covering Excavated Trench
- 1.15 Maintaining Trench Excavations
- 1.16 Disruption of Storm Drains
- 1.17 Precaution Against Hydraulic Uplift During Construction
- 1.18 Blasting
- 1.19 Nameplates
- 1.20 Special Safety Precautions
- 1.21 Land, Easements and Rights-of-Way
- 1.22 Cleaning Finished Work

1.01 GENERAL

A. These Supplementary Conditions are requirements which amend or supplement the General Conditions specified elsewhere.

B. The duties and obligations imposed by these Supplementary Conditions 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.

C. This project is subject to the American Iron and Steel and the Build America, Buy America Act (BABA). The amendments to the Clean Water Act, as part of WRRDA, apply the American Iron and Steel (AIS) requirements to all treatment work projects. Furthermore, BIL extends this procurement requirement to all SRF construction projects going forward with the inclusion of the Build America, Buy America Act (BABA). Starting on May 14, 2022, all steel, iron, manufactured products, non-ferrous metals, plastic and polymer-based products (including polyvinylchloride, composite building materials and polymers used in fiber optic cables), glass (including optic glass), lumber, and drywall used in

infrastructure projects for federal financial assistance programs must be produced in the United States. MassDEP ensures that the required procurement language is included in contracts and conducts field verifications of project compliance.

D. Assertion of any claim for any additional compensation or damages on account of and/or the fulfillment of these Supplementary Conditions will not be allowed.

E. **The BABA requirements are waived for this Project** based on EPA's Decision Memorandum titled Adjustment Period Waiver of Section 70914(a) of P.L. 117-58, Build America, Buy America Act for SRF Projects that have Initiated Design Planning issued September 2, 2022.

1.02 LIMITS OF NORMAL EXCAVATION

A. In determining the quantities of excavation to which unit prices shall apply, the limits of normal width and depth of excavation shall be as described below, unless other limits are indicated in the Contract Documents.

B. For pipes in trench, the normal width of the trench shall be measured between vertical planes which are a distance apart equal to the sum of 18 inches plus 1-1/3 times the nominal inside diameter of the pipe. If the width so computed is less than 3.0 feet, a width of 3.0 feet shall be taken as the normal width for payment. The normal depth shall be measured to a distance of 0.5 feet below the bottom of the pipe in earth and 0.5 feet in rock, unless there be a cradle underneath the pipe, in which case the normal depth shall be measured to the underside of the cradle. The trench width for the cradle shall be assumed to be that specified above for pipes in the trench.

C. For concrete placed directly against undisturbed earth, the normal width and depth of the excavation for such concrete shall be measured to the neat lines of the concrete as indicated on the Drawings or as ordered.

D. For concrete placed against rock surfaces resulting from rock excavation, the normal width and depth of the excavation shall be measured to 4 inches outside the neat lines of the concrete as indicated on the Drawings or as ordered.

E. For other structures, except manholes as noted below, the normal width shall be measured between vertical planes 1.0 feet outside the neat lines of the several parts of the structure, except that the width at any elevation shall be measured as not less than the width at a lower elevation. The normal depth shall be measured to the underside of that part of the structure for which the excavation is made.

F. No additional width or depth of trenches excavated in earth or rock shall be allowed at standard circular manholes. They pay limit for rock removed outside proposed manholes shall commence one foot (1.0) outside the widest dimension of the structure or shall be the maximum connecting trench width, whichever is greater.

G. Wherever bell holes are required for jointing pipe, they shall be provided without additional compensation over and above that resulting from measurements as above described.

1.03 BOLTS, ANCHOR BOLTS AND NUTS

A. Furnish bolts, anchor bolts, nuts, washers, plates and bolt sleeves required by equipment to be installed under this Contract in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. Anchor bolts, nuts, washers, plates, and bolt sleeves shall be galvanized 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. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A307. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to ANSI Standard B1.1-1974 for Unified Inch Screw Threads (UN and UNR Thread Form).

E. Bolts, anchor bolts, nuts and washers, specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

F. Bolts, anchor bolts, nuts, and washers specified to be stainless steel shall be Type 316 stainless steel unless otherwise indicated or specified.

G. 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 inches by 4 inches by 3/8 inches 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.

1.04 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 galvanized.

1.05 SLEEVES

A. 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 1 inch above the finished floor surface. Threaded nipples shall not be used as sleeves.

B. Sleeves in exterior walls below ground or in walls to have liquids on one or both sides shall have a 2 inch annular fin of 1/8 inch plate welded with a continuous weld completely around the sleeve at about mid-length. Sleeves shall be galvanized after the fins are attached.

C. All sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

1.06 CUTTING AND PATCHING

A. The Contractor shall leave all chases or openings for the installation of his own or any other contractor's or subcontractor's work, or shall cut the same in existing work, and shall see that all sleeves or forms are at the Work and properly set in ample time to prevent delays. He shall see that all such chases, openings, and sleeves are located accurately and are of proper size and shape and shall consult with the Engineer and the contractors and subcontractors concerned in reference to this work.

B. In case of his failure to leave or cut all such openings or have all such sleeves provided and set in proper time, he shall cut them or set them afterwards at his own expense, but in so doing he shall confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the written consent of the Engineer.

C. The Contractor shall carefully fit around, close up, repair, patch, and point around the work specified herein to the satisfaction of the Engineer.

D. All of this work shall be done by careful workmen competent to do such work and with the proper small hand tools. Power tools shall not be used except where, in the opinion of the Engineer, the type of tool proposed can be used without damage to any work or structures and without inconvenience or interference with the operation of any facilities. The Engineer's concurrence with the type of tools shall not in any way relieve or diminish the responsibility of the Contractor for such damage, inconvenience, or interference resulting from the use of such tools.

E. The Contractor shall not cut or alter the work of any subcontractors or any other contractor, nor permit any of his subcontractors to cut or alter the work of any other contractor, or subcontractor, except with the written consent of the contractor or subcontractor whose work is to be cut or altered or with the written consent of the Engineer. All cutting and patching or repairing made necessary by the negligence, carelessness, or incompetence of the Contractor or any of his subcontractors shall be done by or at the expense of the Contractor and shall be the full responsibility of the Contractor.

1.07 FOUNDATIONS, INSTALLATION AND GROUTING

A. Furnish materials and construct suitable concrete foundation for all equipment installed under this Contract, even though such foundations may not be

indicated on the Drawings. The tops of foundations shall be at such elevations as will permit grouting as specified below.

B. Equipment shall be installed by skilled mechanics and in accordance with the instruction of the manufacturer.

C. In setting pumps, motors, and other items of equipment customarily grouted, make an allowance of at least 1-in. for grout under the equipment bases. Shims used to level and adjust the bases shall be steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the completed work. Unless otherwise permitted, all grout shall be a suitable nonshrink grout.

D. Grout shall be mixed and placed in accordance with the recommendations of the manufacturer. Where practicable, the grout shall be placed through the grout holes in the base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamber around the top edge of the finished foundation.

E. Where such procedure is impracticable, the method of placing grout shall be as permitted by the Engineer. After the grout has hardened sufficiently, all forms, hoppers, and excess grout shall be removed, and all exposed grout surfaces shall be patched in an approved manner, if necessary, given a burlap-rubbed finish, and painted with at least two coats of an acceptable paint.

1.08 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. Arrange for the services of qualified factory service representatives from the companies manufacturing or supplying equipment and/or materials to be used or installed in the work as specified, to perform the following duties.

B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before others operate it, 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 that specifically states "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 manufacturer's representatives, the Contractor shall make all arrangements to have the manufacturer's representatives present when the field acceptance tests are made by the Engineer without additional cost to the Owner.

1.09 OPERATING INSTRUCTIONS AND PARTS LISTS

A. Where reference is made in the Technical Specifications to operating instructions and spare parts lists, furnish, for each piece of equipment, six complete sets giving the information listed below:

1. Clear and concise instructions for the operation, adjustment, and lubrication and other maintenance of the equipment. These instructions shall include a complete lubrication chart.

2. List of all parts for the equipment, with catalog numbers and other data necessary for ordering replacement parts.

B. Such instructions and parts lists shall be annotated to indicate only the specific equipment furnished. References to other sizes and types or models of similar equipment shall be deleted or neatly lined out.

C. Such operating 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.

1.10 LUBRICANTS

A. During testing and prior to acceptance, Furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

1.11 SPECIAL TOOLS

A. For each type of equipment furnished 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. Properly store and safeguard such special tools until completion of the work, at which time they shall be formally transmitted and delivered to the Owner.

1.12 EQUIPMENT DRIVE GUARDS

A. All equipment driven by open shafts, belts, chains, or gears shall be provided with acceptable all-metal guards enclosing the drive mechanism. Guards shall be constructed of galvanized sheet steel or galvanized woven wire or expanded metal set in a frame of galvanized steel members. Guards shall be secured in position by steel braces or straps that will permit easy removal for servicing the equipment. The guards shall conform in all respects to all applicable safety codes and regulations.

1.13 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or by other acceptable materials.

1.14 COVERING EXCAVATED TRENCH

A. In addition to the requirements in Section 00700 titled Interference with and Protection of Streets. Cover all open excavations when construction

operations are suspended at the end of the day, or in excavated trenches where work is not actually in progress. Cover shall be capable of withstanding AASHTO H20-S16 loading. This cover shall consist of steel plates or some other satisfactory cover of adequate size and strength suitably held in place to keep all traffic out of excavations, all as verified in writing by the Contractor. The cover shall be laid over the excavation until it is backfilled.

1.15 MAINTAINING TRENCH EXCAVATIONS

A. The length of trench opened at any time, from point where ground is being broken to completed backfill, and also the amount of space in streets or public and private lands occupied by equipment, trench, and supplies, shall not exceed the length of space considered reasonably necessary and expedient by the Engineer. In determining the length of open trench or spaces for equipment, materials, supplies and other necessities, the Engineer will consider: the nature of the lands or streets where work is being done; types and methods of construction and equipment being used; inconvenience to the public or to private parties; possible dangers; and other proper matters. All work must be constructed with a minimum inconvenience and danger to the public and all other parties concerned.

B. Whenever any trench obstructs pedestrian and vehicular traffic in or to any public street, private driveway or property entrance, or on private property, take such means as may be necessary to maintain pedestrian and vehicular traffic and access. Until such time as the work may have attained sufficient strength to support backfill, or if for any other reason it is not expedient to backfill the trench immediately, construct and maintain suitable plank crossing and bridges to carry essential traffic in or to the street, driveway or property in question, as specified or directed.

C. Suitable signs, lights, and such items required by Police Authorities to direct traffic, shall be furnished and maintained by the Contractor at his own expense.

D. Keep streets and premises free from unnecessary obstructions, debris and all other materials. The Engineer may, at any time, order all equipment, materials, surplus from excavations, debris and all other materials lying outside that length of working space, promptly removed. Should the Contractor fail to remove such material within 24 hours after notice to remove the same, the Owner may cause any part or all of such materials to be removed by such persons as he may employ, at the Contractor's expense; and

may deduct the costs thereof from payments which may be or may become, due to the Contractor under the Contract. In special cases, where public safety urgently demands it, the Owner may cause such materials to be removed at the Contractor's expense without prior notice.

1.16 DISRUPTION OF STORM DRAINS

A. Portions of the Work may be located in areas that are serviced by storm drains. Take extreme precaution to minimize disruption of the drains, and repair and/or make restitution for repairs by others for all disruptions caused by the construction operations.

1.17 PRECAUTION AGAINST HYDRAULIC UPLIFT DURING CONSTRUCTION

A. Protect all structures against hydraulic uplift until such structures have beneficially completed.

1.18 BLASTING

A. Blasting will not be permitted.

1.19 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. Coordinate nameplate text requirements with Engineer prior to fabrication. Nameplates shall be securely mounted in a readily visible location approved by the Engineer. Equipment Specification sections may contain additional information regarding nameplates.

B. This requirement shall not apply to standard manually operated hydrants or to gate, 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 Identification Schedule indicated on the drawings or furnished later by the Engineer.

1.20 SPECIAL SAFETY PRECAUTIONS

A. Contractor shall take all necessary safety precautions in completing the work including coordinating with and complying with emergency procedures and requirements of the Owner, Police Department, Fire Department, and the Rhode Island

Department of Environmental Management. The Contractor shall comply with all applicable federal, state and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property. The Contractor shall have all necessary safety apparatus on-site and workers shall be instructed in its use.

materials shall be disposed of off-site and the work left broom clean, to the satisfaction of the Engineer.

END OF SECTION

1.21 LAND, EASEMENTS, AND RIGHTS-OF-WAY

A. As indicated, a portion of the work may be located within easements and/or rights-of-way, obtained or which will be obtained by the Owner, through private property. On all other lands, the Contractor has no rights unless he obtains them from the proper parties as specified in Section 00700, Occupying Private Land.

B. Prior to issuance of the Notice to Proceed, the Owner shall obtain all land, easements and rights-of-way necessary for carrying out and for the completion of the work to be performed pursuant to the Contract Documents, unless otherwise mutually agreed.

C. The Owner shall provide to the Contractor information which delineates and describes the lands owned and rights-of-way acquired.

D. The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities or for storage of materials.

E. If however, lands, easements or rights-of-way cannot be obtained before work on the project begins, the Contractor shall begin his work upon such land, easements or rights-of-way as have been previously acquired by the Owner, and no claims for damages whatsoever will be allowed by reason of its inability to procure the lands, easements, or rights-of-way for the said work, the Contractor shall not be entitled to make or assert a claim for damages by reason of the said delay, or to withdraw from the Contract except by consent of the Owner. Time for completion of work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to set forth in writing.

1.22 CLEANING FINISHED WORK

A. After the work is completed, the pipes, manholes and structures shall be carefully cleaned free of debris and dirt, broken masonry, and mortar, and left in first class condition, ready to use. All temporary or excess

DIVISION 01

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SECTION 01010

SUMMARY OF WORK AND CONTRACT MILESTONES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work covered by the Contract, listing of Owner, Project location, Engineer. Sequence requirements, the Contractor's use of the premises Owner's occupancy requirements, State Sales and Use Tax, Non Discrimination in Employment, and Wetland and Waterways.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. 2023 Pump Station Improvements consists of the following work:
- Myles Standish Boulevard Wastewater Pumping Station
 - Full pumping station rehabilitation/replacement including but not limited to converting station from dry pit/wet pit station to new submersible station with valve vault and new submersible pumps, piping, electrical and instrumentation associated improvements.
 - Partridge Circle Wastewater Pumping Station
 - Removal of existing submersible pump and installation of new pumps and guide rail system
 - Wellesley Circle Wastewater Pumping Station
 - Replacement of existing suction lift pumps
 - School Street Wastewater Pumping Station
 - Replacement of existing generator
 - Stevens Street Wastewater Pumping Station
 - Replacement of existing generator
 - Davis Street Wastewater Pumping Station
 - Convert existing power (Single Phase to 3-Phase)
 - Industrial Park Wastewater Pumping Station
 - Replacement of existing generator
 - Startup of new equipment and demonstration of control strategies, and activation of pumping station improvements
 - Electrical work as shown in the contract documents - Electrical drawings and Specifications Division 16
 - Install instrumentation and control panels furnished under Division 13 and Division 11

All as more particularly indicated, shown or described in the Drawings, Specifications, and other Contract Documents.

1.03 OWNER

- A. City of Taunton, Department of Public Works
90 Ingell Street
Taunton, MA 02708
Telephone: 508-821-1434
Contact: Fred Cornaglia, Commissioner

1.04 PROJECT LOCATION

- A. Multiple Location within the City Station
Taunton, MA 02708

1.05 ENGINEER

- A. BETA Group, Inc.
701 George Washington Highway
Lincoln, Rhode Island 02865
Telephone: 401-333-2382

Contact: Alan Gunnison, P.E.
Email: agunnison@beta-inc.com

1.06 CONTRACT MILESTONES

A. Shop Drawings and Procurement

1. Shop drawings shall be submitted and approved within 90 days of Notice to Proceed.
2. Documentation of mechanical and electrical equipment procurement and delivery dates shall be submitted within 100 days of Notice to Proceed.

B. FINAL COMPLETION

1. Final Completion, as defined in the Contract Agreement Article 1.2.x, shall be achieved within 950 calendar days from the Notice to Proceed date.

1.07 WORK SEQUENCE

- A. In order that Work may be conducted with minimum inconvenience to the public and, work under this Contract may be coordinated with other work which may be under construction or contemplated, and that work under the Contract may conform to conditions which it has been undertaken or conditions attached to a right-of-way or particular location for this work, the Engineer may determine the point or points and time or times when portions of work will commence or be carried on and may issue orders pertaining to the work sequence, relative to the rate of progress on several portions of the work.

1.08 CONTRACTOR USE OF PREMISES

- A. The Contractor's use of premises shall be within the limits shown on the Drawings and as defined in Section 00500 – Contract Agreement, for the performance of the Work.
- B. The Contractor shall maintain access and utilities to the existing pumping station facilities at all times.
- C. The Contractor shall assume full responsibility for security of all materials and equipment on the site, including those of his subcontractor's.

- D. If directed by the Owner, the Contractor shall move any stored items that interfere with operations of the Owner.
- E. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.09 OWNER OCCUPANCY REQUIREMENTS

- A. The existing wastewater pumping stations convey the City's wastewater to the Taunton Wastewater Treatment Facility. The existing collection systems and force mains servicing the existing stations must remain in full service at all times, throughout the duration of the project.
- B. The Owner requires safe and unhindered access to wastewater pumping stations for the purpose of operating and maintaining the stations, throughout the duration of the Contract.

1.10 STATE SALES AND USE TAX

- A. Materials and equipment purchased for installation under this Contract are exempt from Massachusetts Sales Tax. The Contractor shall file for exemption on behalf of the Owner with the Commonwealth of Massachusetts Department of Revenue as required by law. The exemption from the Sales Tax shall be taken into account by the Contractor during bidding.

1.11 NONDISCRIMINATION IN EMPLOYMENT

- A. Contracts for work will obligate the Contractors and subcontractors not to discriminate in employment practices.
- B. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, handicap, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed and the employees are treated during employment without regard to their race, color, religion, sex, age, handicap, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading; demotions, or transfers; recruitment or recruitment advertising, layoffs, or terminations; rates of pay or other forms of compensation; selection for training including apprenticeship; and participation in recreational and education activities. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notice to be provided setting forth the provisions of this non-discrimination clause. The Contractor will in all solicitations or advertisements for employees placed by or on behalf on the Contractor state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, age, handicap or national origin. The Contractor will cause the foregoing provisions to be inserted in all sub-contracts for any work covered by this Contract so that such provisions will be binding upon each sub-contractor and upon sub-contracts for standard commercial supplies or raw materials.
- C. The Contractor shall keep such records and submit such reports concerning the racial and ethnic origin of applicants for employment and employees as the Owner may require as consistent with Federal and State law. The Contractor agrees to comply with such rules, regulations, or guidelines as the Commonwealth of Massachusetts may implement these requirements. The Contractor further warrants, that he will comply with the President's Executive Order No. 11246 or any preceding similar Executive Order relating thereto.

- D. Contractors must, if required, submit a compliance report (EPA Form 5720-4) concerning their employment practices and policies in order to maintain their eligibility to receive award of the Contract.
- E. Contractors must, submit a list of all Subcontractors who will perform work on the project, and written signed statements from authorized agents of labor pools with which they will or may deal with for employees on the work, together with any information to the effect that such labor pools' practices or policies are in conformity with said Executive Order that they will affirmatively cooperate in or offer no hindrance to the recruitment, employment, and equal treatment of employees seeking employment and performing work under this Contract; or a certification as to when such agents or labor pools have failed or refused to furnish them, prior to award of the Contract.
- F. Contractor will be required to comply with Equal Opportunity Requirements and to abide by the prevailing wage rates for Public Work Projects for all employees on the job. It is the responsibility of Bidders to inform themselves as to the local labor conditions, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of wage rates. Information is available at the Department of Labor.
- G. Contractor shall comply with the Minority and Women Workforce Participation goals as outlined in the Commonwealth of Massachusetts Supplemental Equal Employment Opportunity, Non-Discrimination and Affirmative Action Program.

1.12 WETLANDS AND WATERWAYS

- A. The Contractor's attention is directed to the fact that a portion of the work is located within and/or immediately adjacent to wetlands and waterways. Work within these areas is subject to the jurisdiction of the Massachusetts Department of Environmental Protection. All requirements and/or control measures deemed necessary by the Department shall be strictly adhered to throughout the duration of this Contract.
- B. The Contractor shall not have or assert any claim for nor shall he be entitled to any additional compensation or damages on account of requirements set forth by the Department of Environmental Protection regarding wetlands and waterways encountered during construction.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01015

SPECIAL CONDITIONS

1.01 BYPASS PUMPING SYSTEM PLAN

- A. The Contractor shall be required to submit a plan depicting the bypass pipe sizes, pump sizes, locations, proposed suction piping to existing sewer manholes, discharge piping to proposed connection on the existing force main, and an associated sequence of operation associated with said plan. The bypass system shall be designed and stamped by a professional engineer registered in the Commonwealth of Massachusetts. The bypass shall be alarmed, maintained and operated by the Contractor.
- B. Systems reliant on portable pump systems shall also be able to be operated in Automatic mode, and be able to automatically regulate discharge rate based on level
- C. The Engineer shall retain the right to request any additional information that he or she feels ensures the integrity of the existing system, and consequently, should be incorporated into the submittal.
- D. The submittal shall be in the form of a shop drawing and no work may proceed without the approval of said shop drawing by the Engineer.
- E. Refer to specification section 02149 – Maintaining Existing Flows for requirements.
- F. Refer to 1.05 A of this Section.

1.02 EXCAVATIONS

A. Test Pits

1. **Test pits at Myles Standish pump station are to be completed prior to submission of pump shop drawings. Proposed pumps are sized based on worst case scenario for assumed force main size and may need to be modified.**
2. Prior to the start of any construction, the Contractor must conduct test pits as shown on the Contract Drawings, at locations where indicated, where directed by the Engineer, and to verify site conditions described in Paragraph 1.02A 2 of this section.
3. Test pits shall be conducted to field verify exact size, material, location, elevation, alignment (vertical and horizontal) of existing piping and utilities.
4. Test pit soil shall be returned to the excavation once the test pits are completed. Any excess excavated test pit soil shall be managed in accordance with Section 02080, the Utility Related Abatement Measure, and the Contractor's approved soil management plan.
5. The Contractor is to provide record of utility elevation, size, material, and alignment to the Engineer upon completion of the test pits. The Contractor shall

notify the Engineer of any conflicts between the proposed piping and existing piping or utilities prior to starting installation of the proposed piping. The test pits are to be completed in the presence of the Engineer. Provide 48-hours notice to the Engineer prior to completing test pits.

1.03 PROJECT STAGING AREA

A. The Contractor is responsible for identifying and securing a staging area within the City limits for the project. The City will **not** be providing a staging area for the project. The Contractor shall bear all costs associated with the selected staging area and its use. The Contractor is responsible for securing all required permits to utilize the selected property for the Contractor's intended use.

1.04 SOIL STOCKPILE

A. Excess soil shall be managed at the temporary soil staging area located at 100 Arlington Street. Soil shall be managed in accordance with the Contractor's Soil Management Plan and in accordance with Section 02080 and the stockpile detail shown on sheet CD-1.

B. 100 Arlington Street shall only be utilized for managing excess soil. No other materials may be stored at this location.

C. Soil shall be stored at 100 Arlington Street a maximum of 90-working days after the date of excavation.

D. The Contractor shall provide all equipment, labor, and materials associated with handling the excess soil as specified and detailed.

1.05 START UP

A. Once all equipment is tested and operation has been demonstrated by the Contractor the startup period shall begin. During the startup period the pump station shall operate in Automatic Mode for a period of seven (7) consecutive days without interruption or correction. The bypass system shall remain in place during the startup period at no additional cost to the owner.

B. See Section 01710 Startup for additional requirements.

1.06 MYLES STANDISH ELECTRICAL SERVICE AND TRANSFORMER

A. The existing electric service for the pump station site is direct burry cable.

B. Coordinate with Taunton Municipal Light and Power for all work associated with the electric service.

- C. The transformer on site also provides power for the streetlights and one signalized intersection on Myles Standish Boulevard.
1. Temporary shutdowns shall be coordinated with TMLP as needed prior to installation of the bypass system
 2. In addition to the police details required to complete the proposed work within the right of way the contractor shall also provide police details for the signalized intersection on Myles Standish Boulevard during all scheduled power shutdowns.
 3. The bypass pumping system for the pump station shall be installed, tested, and approved for use by the Engineer prior to starting any of the proposed site work.
 4. The Contractor shall provide a temporary 120/208V power generator for the streetlights and traffic signal. This shall include power generation equipment, fuel, maintenance, electrical connections and appurtenances required to provide temporary power.

1.07 LIQUID PROPANE TANKS

- A. Liquid propane tanks are currently in use at the following pump stations.
1. Myles Standish
 2. Stevens Street.
- B. The Contractor shall coordinate with the liquid propane service provider for removal of existing tanks. The contractor is responsible for removal and disposal of all ancillary items associated with propane tanks including but not limited to pipe and concrete pads.
1. W.H. Riley & Son Taunton, MA (774) 643-0326.

END OF SECTION

SECTION 01020

ALLOWANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Contingencies and their respective value which have been established in the BID as an estimated lump sum to facilitate comparison of bids only.

B. Related Sections

1. Section 00300 - Bid Forms
2. Section 01025 - Measurement and Payment

1.02 ALLOWANCES

A. Utility Services - Bid Item No.3.

1. Provide the installation, relocation, replacement or repair of utility services which are not specified or identified for replacement on Contract Drawings or as directed by the Engineer.
2. Coordinate all work with the respective utility company or department providing access to the site at the appropriate time to prevent any delay in the work specified to be done under these Contract Documents.

1.03 PAYMENT PROCEDURES

- A. Under these items, the Contractor shall be reimbursed for charges for the allowances required and authorized by the Owner and Engineer, as detailed in Section 01025 - Measurement and Payment.
- B. The lump-sum price for allowances is established in Section 00300 - Bid Forms as an estimated figure to facilitate comparison of bids only. The actual amount to be paid under this item shall constitute full compensation for services rendered.
- C. The lump-sum price for this item shall NOT include any costs associated with services rendered for routine utility markings, repair damages incurred as a result of the Contractor's operations, relocations of utilities done at the Contractor's request and/or convenience, or any other unauthorized services rendered by utility companies. The purpose of this item is strictly for the Contractor's reimbursement for those services authorized by the Owner or Engineer prior to the work being performed.
- D. The Contractor will be paid based on the actual PAID invoiced amount from the authority in question as approved by the Engineer. If the total cost for such charges is greater or less than the allowance amount stated under this item of the BID, a debit or credit of the difference in cost shall be to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials as required and ordered by the Engineer shall conform to the Contract Documents.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation, relocation, or repair of utilities, shall be performed in accordance with the Contract Documents.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Measurement and payment criteria applicable to the Work performed under a unit price and/or lump sum payment method of Items listed in the BID.

B. Related Sections

1. Section 00300 - Bid
2. Section 00500 - Agreement

1.02 LUMP SUM PRICES

- A. Payment will be computed on the basis of the percentage of work completed on each Item in the contract BID as determined by the Engineer. Lump sum prices are to include the cost of all necessary materials, labor, equipment, overhead, profit and other applicable costs. (See Par. 1.03, this Section.)

1.03 PRICES INCLUDE

- A. The prices stated in the Proposal include full compensation not only for furnishing all the labor, equipment and material needed for, and for performing the work and building the structures contemplated by, the Contract, but also for assuming all risks of any kind for expenses arising by reason of the nature of the soil, ground water, or the action of the elements; for all excavation and backfilling; for the removal of and delay or damage occasioned by trees, stumps, tracks, pipes, ducts, timber, masonry or other obstacles; for removing, protecting, repairing, or restoring, without cost to the Owner, all pipes, ducts, drains, sewers, culverts, conduits, curbs, gutters, walks, fences, tracks, or other obstacles, road pavements and other ground surfacing whether shown on plans or not for draining, damming, pumping or otherwise handling and removing, without damage to the work or to other parties, and without needless nuisance, all water or sewage from whatever source which might affect the work or its progress, or be encountered in excavations made for the work; for maintaining existing plant flows, for providing temporary equipment, systems and facilities as specified and as necessary so that the pumping station may continue operation during construction; for furnishing, inserting and removing as directed, all shoring staging, cofferdams etc.; for all signs, fencing, lighting, watching, guarding, temporary surfacing, bridging, snow removal, etc., necessary to maintain and protect travel on streets, walks and private ways; for making all provisions necessary to maintain and protect buildings, fences, poles, trees, structures, pipes, ducts and other public or private property affected or endangered by

the work; for the repair or replacement of such things if injured by neglect of such provisions for removing all surplus or rejected materials as may be directed; for replacing, repairing and maintaining the surfaces of streets, highways, public and private lands if and where disturbed by work performed under the Contract or by negligence in the performance of work under the Contract; for furnishing the requisite filling materials in case of any deficiency or lack of suitable materials; for obtaining all permits and licenses and complying with the requirements thereof, including the cost of furnishing any security needed in connection therewith; for any and all expense on account of the use of any patented device or process; for protection against inclement or cold weather; for all expenses incurred by or on account of the suspension; interruption or discontinuance of work; for the cost of the surety bond and adequate insurance; for all taxes, fees, union dues, etc., for which the Contractor may be or become liable, arising out of his operations incidental to the Contract; for providing equipment on the site and off site; for providing a field office and its appurtenances and for all general and incidental expenses; for tools, implements and equipment required to build and put into good working order all work contemplated by the Contract; for maintaining and guaranteeing the same as provided; and for fulfilling all obligations assumed by the Contractor under the Contract and its related documents.

- B. The Owner shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and for all risks and obligations undertaken by the Contractor under and as required by the Contract.
- C. The prices shall also include the removal and disposal of the existing pipe being replaced or repaired, unless otherwise specified in the Contract.

1.04 GENERAL BID, PART I

WASTEWATER PUMP STATION IMPROVEMENTS

BID ITEM NO. 1A THROUGH 1G PUMPING STATION REHABILITATION

- A. Payment of the lump-sum price bid in the Bid Form for Item No. 1 shall constitute full compensation for all labor, material, tools, equipment and incidentals necessary for rehabilitating the existing pumping stations as indicated on the Drawings and as specified, including but not limited to mobilization and demobilization; coordination with Owner and Engineer; all required demolition; constructing improvements; phasing work to maintain existing flows; protection of all existing structures and utilities; the removal and disposal of existing equipment; concrete work; startup; and testing complete as shown on the Drawings and specified herein.
- B. Items shall also constitute compensation for all civil site, structural, mechanical, electrical, instrumentation, and all associated appurtenant work, as indicated on the Drawings and as specified in the Bidding and Contract Requirements and Divisions 1 through 17 except for the requirements of other Bid Items.

C. For all equipment and systems provided in Division 11, Division 13, Division 15, Division 16, and Division 17:

- Five (5) percent of the equipment/system cost will be withheld until the operations and maintenance manual has been approved and all copies have been turned over to the Owner.
- Five (5) percent of the equipment/system cost will be withheld until the spare parts and lubricants have been turned over to the Owner.
- Five (5) percent of the equipment/system cost will be withheld until the manufacturer's representative has certified the equipment, assisted with the start-up and completed the training.
- Five (5) percent of the equipment/system cost will be withheld until the testing has been completed and the test results have been submitted and approved.

BID ITEM NO. 2A MANAGEMENT OF SOIL/FILL AND CONTAMINATED MATERIALS

1. Under this Item, the Contractor shall be paid for management of soil/fill and contaminated materials at the lump sum price stated in the Bid Schedule.
2. The lump sum price shall constitute full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for managing soil/fill and contaminated material; including segregating, handling, staging, testing, and characterization of all soil and fill material prior to final transport and disposal as well as the costs associated with characterizing the destination site as required to assess background conditions; all controls necessary to maintain compliance with regulatory requirements relative to handling contaminated soils and materials; submittal and approval of all required and specified Plans; LSP services; analytical testing and characterization of all excavated soil and fill material handled; health and safety equipment; securing a staging area for stockpiling soil pending analytical testing, reuse, or disposal; protecting the stockpile areas. All costs related to transporting soils to and, if not disposed of offsite, from the staging area, if reused, shall be included for payment in this item; air monitoring; controlling the spread of airborne contaminants; all notifications, fees, permits, and taxes; and all other requirements specified in other sections of the Contract Documents; and any other work not covered by other Bid Items.
3. The Contractor will be eligible for payment for a portion of the lump sum price based on the Schedule of Values submitted in accordance with Section 01026, as approved by the Engineer.

BID ITEM NO. 2B REMOVE & DISPOSE OF RE-USE FACILITY SOIL

1. The quantity of Re-use Facility Soil to be paid for under this Item shall be the actual number of tons of Re-use Facility Soil material removed and disposed of as directed and authorized by the Engineer.
2. The unit price shall include all costs associated with the removal and disposal of Re-use Facility Soil including but not limited to labor, equipment disposal fees and furnishing the City with the appropriate material shipping record forms.
3. The Contractor will be eligible for up to 75% of the unit price when material is transported and disposed of offsite. The remaining 25% of the unit price will be paid upon the Owner's receipt of all signed transportation and disposal documents.

BID ITEM NO. 2C REMOVE & DISPOSE OF IN-STATE LANDFILL MATERIAL

1. The quantity of In-State Landfill Material to be paid for under this Item shall be the actual number of tons of In-State Landfill Material removed and disposed of as directed and authorized by the Engineer.
2. The unit price shall include all costs associated with the removal and disposal of In-State Landfill Material including but not limited to labor, equipment disposal fees and furnishing the City with the appropriate material shipping record forms.
3. The Contractor will be eligible for up to 75% of the unit price when material is transported and disposed of offsite. The remaining 25% of the unit price will be paid upon the Owner's receipt of all signed transportation and disposal documents.

BID ITEM NO. 2D REMOVE & DISPOSE OF OUT-OF-STATE LANDFILL MATERIAL

4. The quantity of Out-of-State Landfill Material to be paid for under this Item shall be the actual number of tons of Out-of-State Landfill Material removed and disposed of as directed and authorized by the Engineer.
5. The unit price shall include all costs associated with the removal and disposal of Out-of-State Landfill Material including but not limited to labor, equipment disposal fees and furnishing the City with the appropriate material shipping record forms.
6. The Contractor will be eligible for up to 75% of the unit price when material is transported and disposed of offsite. The remaining 25% of the unit price will be paid upon the Owner's receipt of all signed transportation and disposal documents.

BID ITEM NO. 3 UTILITY SERVICE ALLOWANCE

- A. The lump sum price to be paid for under this Item shall constitute full compensation as detailed in Section 01020 - Allowances, and not specifically paid for under other Items, as directed by the Engineer.

- B. The lump sum price allowance for this Item established in the Bid is an estimated figure to facilitate comparison of bids only. The actual amount to be paid under this Item to the Contractor will be the amount invoiced by the utility company.
- C. The lump sum price allowance for this Item shall NOT include any costs associated with Items and/or services for which specific payment Items are provided for under the Bid.
- D. If the total cost for such charges is greater or less than the allowance amount stated under this Item of the Bid, a debit or credit of the difference in such cost shall be to the Owner.

1.05 TOTAL BID

- A. Part I covers the work of the General Contractor and Part II covers work of the Subcontractors.

1.06 PAYMENTS, PART I AND II

- A. Payment of the total price bid in the General Bid for Part I, together with the lump sums bid in the Sub-bid for Part II, shall fully compensate the Contractor for furnishing all labor, materials, equipment and incidentals required to complete the work as outlined above and under Section 01010. Payment shall also include compensation for all other work required to complete the Project as described in the Contract Documents and not specifically mentioned under Part I or II.

1.07 EXTRA WORK

- A. Extra work, if any, will be performed and paid for in accordance with the Owner Contractor Agreement, General Conditions and Supplementary Conditions.

END OF SECTION

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SECTION 01026

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for breakdown of lump sum bid.

B. Related Sections

1. Section 01300 - Submittals

1.02 BREAKDOWN OF LUMP SUM BID

A. Within 20 business days of the date of the executed Contract, a list detailing the breakdown of the lump sums bid by the appropriate Divisions of these Specifications or as otherwise directed by the Engineer, shall be submitted for review and concurrence by the Engineer. This list will be used by the Engineer as a guide in preparing estimates for payment. The list shall be an accurate representation of costs required to complete the Work in accordance with the Contract Documents.

B. A schedule of the monthly value of work done based on the Progress Schedule submitted under Section 01300 - Submittals shall be submitted within 20 business days of the date of the executed Contract. The schedule shall show the total sum of work done for each month of the projected construction period and shall be updated monthly to reflect the actual amount requisitioned for payment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01035

MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Procedures for making modifications to the Contract by change orders or other means.

B. Related Sections

1. Document 00500 - Agreement

1.02 CHANGE ORDERS

- A. In general Change Orders will be issued for modification of Contract documents which will incorporate changes in the Contract requirements, including additions or deletions in the Work; for unforeseen field conditions which will necessitate changes in the Work; changes in code provisions or other requirements of federal, state or local authority requiring changes in the Work; changes in the availability of products or for incorporating new products into the work and for changes directed by the Engineer for the benefit of the Owner.
- B. Authority to execute Change Orders shall be that of the Owner and not of the Contractor. Changes Orders will, in general, originate by a "Change Order Proposal Request" or by issuance of a "Construction Change Authorization".
- C. Unless authorized by the Owner, no work shall be performed that is involved in the change until a formal Change Order is issued.
- D. To initiate a Change Order, the Owner will forward a Change Order proposal request describing the proposed changes and if required, include additional or revised drawings and specifications soliciting a formal quotation of cost and time to complete the proposed Change Order work. Upon reaching mutual agreement on the cost and time, the Engineer will sign his approval of the Change Order and submit it to the Contractor for his full signature of acceptance.

1.03 FIELD ORDERS

- A. The Owner may, to avoid costly removal of, or alterations to, present on-going work, issue a Work Directive Change authorizing the Contractor to proceed, subject to later negotiation of the price of the change.

1.04 PRICE AGREEMENTS

- A. Prices agreed upon to cover the Change Orders may be either by mutual acceptance of a lump sum or by unit prices as stated in the Contract bid proposal or actual direct cost plus a percentage for overhead, profit and other expenses consistent with Section 00500 – Contract Agreement.

- B. Work done by a subcontractor entitles the General Contractor a percentage of the sum of the actual direct cost, not including the subcontractor's overhead and profit, consistent with Section 00500 – Contract Agreement.
- C. Method for computing the cost of the change shall be based on the net additional increase. No overhead and profit shall be deducted from prices for changes deleting work.
- D. The Change Order form document shall indicate the net adjustment (+/-) to the total Contract price as a result thereof including extension or reduction of time when applicable.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01040

COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for coordinating the various parts of Work under this Contract.

1.02 REQUIREMENTS

- A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical, instrumentation and electrical work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- G. Coordinate work with all utility companies necessary for completion of work under this contract.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01045

CUTTING, CORING AND PATCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements and limitations for cutting, coring and patching of Work.

B. Related Sections

1. Section 01300-Submittals

1.02 SUBMITTALS

A. In accordance with Section 01300 submit written request in advance of cutting or alteration which affects the following:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alteration.
4. Description of proposed work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

C. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Engineer and secure his written permission and the required Change Order prior to proceeding.

1.03 RELATED SECTIONS

A. Section 15050 – Pipe Penetrations

PART 2 PRODUCTS

2.01 MATERIALS

A. For replacement of items removed, use materials complying with pertinent sections of these specifications.

- B. Sealing materials to be used to seal annular space between cored hole in walls and related pipes to be in accordance with Section 15050.
- C. Sealing cored holes in sewer manholes to be with a resilient seal similar to Kor-N-Seal made by National Pollution Control Systems, Inc., Nashua, NH or similar product, as indicated on the Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions

1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
2. After uncovering the work, inspect conditions affecting installation of new work.
3. If uncovered conditions are not as anticipated, immediately notify the Engineer.
4. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Protection

1. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.
2. Perform cutting and demolition by methods which will prevent damage to portions of the Work.

B. Surface Preparation

1. Provide proper surfaces to receive installation of repair and new work.

3.03 INSTALLATION

- A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for proper performance of the Work.
- B. Execute cutting, fitting, and patching (including excavation and fill) to complete work.
- C. Installation of materials shall be in accordance with manufacturer's instructions.
- D. Installations, repair or replacement of items provided under this Contract shall be in accordance with the Contract Documents.

3.04 FIELD QUALITY CONTROL

- A. In addition to other requirements specified, upon the Engineer's request uncover work to provide for inspection by the Engineer of covered work, and remove samples of installed materials for testing.
- B. Do not cut or alter work performed under separate contracts without the Engineer's written permission.

3.05 ADJUSTING

- A. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

END OF SECTION

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SECTION 01050
FIELD ENGINEERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Survey work and other field engineering responsibilities of the Contractor.

1.02 REQUIREMENTS

- A. The Contractor shall be responsible for layout of the work and the establishing of lines and grades.
- B. Establish elevations, lines, levels, reference marks, batter boards, etc., required during the progress of the Work. Verify such marks by instrument to confirm accuracy.
- C. Locate and protect survey control and reference points.
- D. Make, check, and be responsible for all measurements and dimensions necessary for the proper construction of the Work.
- E. The Engineer will be permitted to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor. The Contractor shall correct any errors found in lines, elevations, reference marks, batter boards, etc.. Such a check shall not be construed as approval of the Contractor's work and shall not relieve or diminish the responsibility of the Contractor for the accurate construction and completion of the Work.
- F. Control datum for survey as shown on Drawings.

1.03 QUALITY ASSURANCE

- A. Qualifications
 - 1. Employ a Civil Engineer or Land Surveyor registered within the Commonwealth of Massachusetts, acceptable to the Engineer.
- B. Certifications
 - 1. Submit certificate signed by the Contractor's Engineer or Land Surveyor stating elevations and locations of the Work are in conformance with the Contract Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01060

PERMITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building codes, Mechanical codes, and Electrical codes, Regulations, Permits and Fees applicable to the project.

1.02 PERMITS BY CONTRACTOR

- A. The Contractor shall secure all necessary permits from the state, city or town authorities having jurisdiction, for digging of trenches in the streets or highways and all other building and construction operations requiring permits.
- B. As a minimum the following permits are required:
 - 1. Tank Removal Permit – City of Taunton Fire Department
 - 2. Electrical Permit – City of Taunton
 - 3. Any permits associated with the Contractor's selected dewatering system.
 - 4. City of Taunton Contractor's License
 - a. Contractor's License Requirements and Application is attached to this specification section.
 - 5. Trench Permit (Jackie's Law) – City of Taunton Dept. of Public Works
 - a. The Permit Application Form is attached to this Specification Section

1.03 PERMITS BY OWNER

- A. The Owner has obtained or will obtain and pay all fees for the permits listed here:
 - 1. No permits were obtained by the Owner for this project.

1.04 CODES

- A. The Contractor shall conform to the requirements of and pay all fees imposed by local and State Building Authorities having jurisdiction over the Work. The Contractor is responsible to conform to all building, mechanical, electrical and plumbing code requirements.
- B. The Contractor shall conform to the latest requirements of the following codes:
 - 1. Federal, State and Municipal Laws
 - 2. 2009 International Building Code (IBC)
 - 3. 2009 International Energy Conservation Code (IECC)
 - 4. Commonwealth of Massachusetts State Building Code, 780 CMR
 - 5. Commonwealth of Massachusetts State Plumbing Code 248 CMR 10.00
 - 6. Commonwealth of Massachusetts Electrical Code 527 CMR 12.00
 - 7. Massachusetts Architectural Access Board (521 CMR)
 - 8. Massachusetts Board of Fire Prevention Regulations (527 CMR)
 - 9. OSHA

10. Any prevailing rules and regulations pertaining to adequate protection and/or guarding of any moving parts or otherwise hazardous locations.

1.04 FEES

A. The cost of all permits secured by the Contractor shall be borne by him and shall be considered as having been included in the price or prices stated in the Bid. Copies of all required permits shall be filed with the Engineer prior to starting work for which a permit is required.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION



City of Taunton

Department of Public Works Commissioner's Office Contractor Licensing Requirements & Application

(Established November 1, 2006)

Construction Contract Year
May 1, 2022 to April 30, 2023

Prepared By: 
Tony Abreau, Assistant Commissioner, Taunton Public Works

Approved By:  3/29/22
Fred Cornaglia, Commissioner, Taunton Public Works

City of Taunton
Department of Public Works Commissioner's Office
Contractor Licensing Requirements

Contractors are licensed by the City of Taunton (City) through the Department of Public Works, Commissioner's Office (DPW). Only licensed contractors may work in the City's layout of a public way to install or work on driveways and underground utilities such as water, sewer, drainage, gas, electrical, or road construction.

1.0 Licensing requirements

1.1

Only utility contractors licensed by or contractors working directly for the City of Taunton are allowed to work within the limits of city streets, sidewalks, easement, layouts, or right-of ways, or to make connections to municipal storm drains, sewers or water lines.

1.2

To assure faithful performance of all work and to indemnify the city against any loss or damage from negligent or defective work a yearly bond in the amount of either, **\$50,000.00 for road projects or \$5,000.00 for sewer laterals**, must be submitted by all contractor applicants. For larger projects, the DPW Commissioner's Office may require the bond to be increased.

1.3

To the fullest extent not prohibited by laws and regulations, the contractor shall indemnify, hold harmless and defend the City of Taunton, its officers, employees, and agents from and against all claims, costs, losses, and damages, including but not limited to attorney's fees, caused by, arising out of, or relating to any claim of action against the City of Taunton, provided that any such claim, cost, loss or damage is caused in whole or in part by any negligent act or omission of the contractor, its employees, agents, or anyone for whose acts any of them may be liable.

1.4

Each contractor shall provide to the City of Taunton a Certificate of Insurance providing evidence of the following:

- 1) Commercial General Liability with limits of not less than \$ **1,000,000** each occurrence and \$ **2,000,000** Annual Aggregate. If the CGL coverage contains a General Aggregate Limit, such General Aggregate shall apply separately to each project. CGL coverage shall be written on ISO Occurrence Form CG 00 01 (1093) or a substitute form providing equivalent coverage and shall cover liability arising from collapse, explosive hazards, underground work by equipment on the street, premises, completed operations, independent contractors, and personal injury. The City of Taunton shall be listed as **"additional insured"** on the CGL policy.

2) Automobile Liability

- a) Business Auto Liability with limits of as least \$ 1,000,000 each accident;
- b) Business Auto coverage must include coverage for liability arising out of all owned, leased, hired, and non-owned automobiles.

3) Workers Compensation and Employers Liability

Employers Liability Insurance limits of at least \$ 500,000 each accident for bodily injury by accident and \$ 500,000 each employee for injury by disease.

1.5

Applications for a contractor's license shall first be submitted to the City Department of Public Works Commissioner for approval or disapproval.

1.6

Each license shall be granted for one year from May 1st until April 30th of the following year, and the required bond and certificate of insurance shall be co-terminus with the license. Such license may be suspended for cause by the Department of Public Works Commissioner which shall report the suspension to the City Council at its next meeting.

1.7

Every Corporation shall submit with its application a copy of its current annual certificate of condition and a copy of any subsequent certificate of change of corporate officers on file with the secretary of state as required by M.G.L.c. 156. §§ 24 and 27.

1.8

Copy of the front and back of the hoisting license of your company's excavator operator.

2.0 Schedule of License Fees

Licensed road opening and utility contractor fees are as follows:

Initial Application Fee	\$500.00
Annual Renewal Fee	\$250.00

3.0 License Application

Complete the License Application identified as Exhibit A

Exhibit A

**City of Taunton
Department of Public Works. Commissioner's Office**

Contractor Licensing Application

Company Name:		
Owners Name:		
Street Address:		
City:	State:	Zip Code:
Telephone Number:	Email Address:	
Country:	Dunn & Bradstreet Number:	Federal Employer ID no.
Contact Person:	Contact Number:	
<u>What geographical area does your firm service?</u>		
<input type="checkbox"/> Metropolitan Boston	<input type="checkbox"/> Massachusetts (Entire State)	<input type="checkbox"/> Vermont
<input type="checkbox"/> Southeastern Mass	<input type="checkbox"/> Rhode Island	<input type="checkbox"/> New Jersey
<input type="checkbox"/> Western Mass	<input type="checkbox"/> New Hampshire	<input type="checkbox"/> New York
<input type="checkbox"/> North of Boston	<input type="checkbox"/> Connecticut	<input type="checkbox"/> Connecticut
Primary Sic Code		Secondary Sic Code
Date company was founded		
<u>Gross Annual Sales</u>		
<input type="checkbox"/> \$0 - \$49,999	<input type="checkbox"/> \$500,000 - \$999,999	<input type="checkbox"/> \$5,000,000 - \$10,000,000
<input type="checkbox"/> \$50,000 - \$99,999	<input type="checkbox"/> \$1,000,000 - \$2,499,999	<input type="checkbox"/> Over \$10,000,000
<input type="checkbox"/> \$100,000 - \$499,999	<input type="checkbox"/> \$2,500,000 - \$4,999,999	
<u>Number of Employees</u>		
<input type="checkbox"/> 1 - 10 employees	<input type="checkbox"/> 20 - 30 employees	<input type="checkbox"/> Over 50 employees
<input type="checkbox"/> 10 - 20 employees	<input type="checkbox"/> 30 - 50 employees	
<u>Bonding Capacity</u>		
<input type="checkbox"/> \$0 - \$49,999	<input type="checkbox"/> \$500,000 - \$999,999	<input type="checkbox"/> \$5,000,000 - \$10,000,000
<input type="checkbox"/> \$50,000 - \$99,999	<input type="checkbox"/> \$1,000,000 - \$2,499,999	<input type="checkbox"/> Over \$10,000,000
<input type="checkbox"/> \$100,000 - \$499,999	<input type="checkbox"/> \$2,500,000 - \$4,999,999	
<u>Business Structure</u>		
<input type="checkbox"/> Profit	<input type="checkbox"/> S Corporation	<input type="checkbox"/> Partnership
<input type="checkbox"/> Non-profit	<input type="checkbox"/> C Corporation	<input type="checkbox"/> Joint Ventures
	<input type="checkbox"/> Sole Proprietor	<input type="checkbox"/> LLC

Qualifications

What contractor licenses in do you currently hold in Massachusetts?

In which Municipalities in Massachusetts do you currently hold road opening licenses?

In the past three years have there been any Municipalities in Massachusetts that has had to pursue legal for your failure to perform?

Please identify Massachusetts's contractor licenses you have that are currently active? Include the license number, type of contractor's license and expiration date.

Please provide four (4) business references including your current bonding company?

Largest Contract:		
<input type="checkbox"/> \$0 - \$49,999	<input type="checkbox"/> \$500,000 - \$999,999	<input type="checkbox"/> \$5,000,000 - \$10,000,000
<input type="checkbox"/> \$50,000 - \$99,999	<input type="checkbox"/> \$1,000,000 - \$2,499,999	<input type="checkbox"/> Over \$10,000,000
<input type="checkbox"/> \$100,000 - \$499,999	<input type="checkbox"/> \$2,500,000 - \$4,999,999	
Contracting Agency for Largest contract:		
Company Comments: (Include a brief description of the goods and/or services your company provides:		
Name of President or CEO		Date:
Telephone Number:		
Name of Individual Completing the Form:		Date:
Signature of Individual Completing the Form:		Date:
Telephone Number:		

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SECTION 01067

COMMONWEALTH OF MASSACHUSETTS AND FEDERAL REQUIREMENTS

PART 1 - GENERAL

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- I - BABA & American Iron and Steel Requirements
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1.01 AMERICAN IRON AND STEEL

A. The Contractor acknowledges to and for the benefit of the City of Taunton (“Owner”) and the Commonwealth of Massachusetts (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 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 Owner 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 Owner or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Owner or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Owner 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 Owner). While the Contractor has no direct contractual privity with the State, as a lender to the Owner for the funding of its project, the Owner 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.

1.02 SUSPENSION AND DEBARMENT

The Contractor agrees that it will fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled "Responsibilities of Participants Regarding Transactions (Doing Business with Other Persons)". The Contractor shall not award any subcontracts or purchase any materials from suppliers that appear on the Excluded Parties List System. The Contractor shall include this requirement in each subcontract and require it to be included in all subcontracts regardless of tier. The Contractor shall maintain reasonable records to demonstrate compliance with these requirements.

1.03 EXCERPTS FROM MASSACHUSETTS STATUTES

A. In addition to the requirements as set forth under "Compliance with Laws" in the AGREEMENT, particular attention is directed to certain stipulations of Chapter 149 of the General Laws of Massachusetts, as amended to date as follows:

Section 25. "Every employee in public work shall lodge, board, and trade where and with whom he elects; and no person or his agents or employees under contract with the commonwealth, a county, city or town, or with a department, board, commission or officer acting therefore, for the doing of public work shall directly or indirectly require, as a condition of employment therein, that the employee shall lodge, board or trade at a particular place or with a particular person. This section shall be made a part of the contract for such employment."

Section 26. "In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works by the commonwealth, or by a county, town, authority or district, or by persons contracting or subcontracting for such works, preference shall first be given to citizens of the commonwealth who have been residents of the commonwealth for at least six months at the commencement of their employment who are

male veterans as defined in clause Forty-third of section seven of chapter four, and who are qualified to perform the work to which the employment relates; and secondly, to citizens of the commonwealth generally who have been residents of the commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect.

Section 34. "Every contract, except for the purchase of, material or supplies, involving the employment of laborers, workmen, mechanics, foremen, or inspectors, to which the commonwealth or any county or any town, subject to section thirty, is a party, shall contain a stipulation that no laborer, workman, mechanic, foreman or inspector working within the commonwealth, in the employ of the contractor, subcontractor or other person doing or contracting to do the whole or a part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than 48 hours in any one week, or more than six days in any one week, except in cases of emergency, or in case any town subject to section thirty-one is a party to such a contract, more than eight hours in any one day, except as aforesaid..."

Section 34A. "Every contract for the construction, alteration, maintenance, repair or demolition of or addition to, any public building or other public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall, before commencing performance of such contract, provide by insurance for the payment of compensation and the furnishing of other benefits under chapter one hundred and fifty-two to all persons to be employed under the contract, and that the contractor shall continue such insurance in full force and effect during the term of the contract. No officer or agent contracting in behalf of the commonwealth or any political subdivision thereof shall award such a contract until he has been furnished with sufficient proof of compliance with the aforesaid stipulations. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the officer or agent who awarded the contract at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice. Notice of cancellation sent by the party proposing receipt of the addressee requested, shall be a sufficient notice..."

Section 34B. "Every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public works for the commonwealth or any political subdivision thereof shall contain stipulations requiring that the contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wage paid to regular police officers employed by him in such city or town."

Attention is directed to Chapter 774 of the Acts of 1972 amending Section 39F of Chapter 30 to read as follows:

Section 39F. "(1) Every contract awarded shall contain the following subparagraphs and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to sub-paragraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontractor work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered

to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontractor including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment for a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor."

Attention is also directed to Chapter 774 of the Acts of 1972 further amending Chapter 30 by adding after Section 39M the following section:

Section 39M. (b) Specifications for such contracts, and specification for contracts awarded pursuant to the provisions of said sections forty-four A to forty-four L of said chapter one hundred and forty-nine, shall be written to provide for full competition for each item of material to be furnished under the contract; except, however, that said specifications may be otherwise written for sound reasons in the public interest stated in writing in the public records of the awarding authority or promptly given in writing by the awarding authority to anyone making a written request therefore, in either instance such writing to be prepared after reasonable investigation. Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished; and an item shall be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said named or described materials.

Section 39N. "Every contract subject to section forty-four A of chapter one hundred forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly."

Attention is also directed to Chapter 1164 of the Acts of 1973 further amending Chapter 30 by adding after Section 39N the following two sections:

Section 39O. "Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety...

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more due to a failure of the awarding authority shall make an adjustment in the contract but shall not include any profit to the general contractor on such increase; and provide further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than 20 days before the general contractor notified the awarding authority of the act or failure to act involved in the claim."

Section 39P. "Every contract subject to section thirty-nine M of this chapter or section forty-four A of chapter one hundred forty-nine which requires the awarding authority, any official, its architect or engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, shall require that the decision be made promptly and, in any event no later than thirty days after the written submission for decision; but if such decision required extended investigation and study, the awarding authority, the official, architect or engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty day period and the data by which the decision will be made."

Attention is also directed to Chapter 30, Section 39R of the General Laws of Massachusetts as amended to date as follows:

Section 39R. (a) The words defined herein shall have the meaning stated below whenever they appear in this section:

(1) "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to section thirty-nine M of chapter thirty, sections forty-four A through forty-four H, inclusive, of chapter one hundred forty-nine and sections thirty B through thirty P, inclusive, of chapter seven.

(2) "Contract" means any contract awarded or executed pursuant to sections thirty B through thirty P, inclusive, of chapter seven and any contract awarded or executed pursuant

to section thirty-nine M of chapter thirty, or sections forty-four A through forty-four H, inclusive, of chapter one hundred forty-nine, which is for an amount or estimated amount greater than one hundred thousand dollars.

(3) "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memorandum invoices, computer printouts, tapes, discs, papers and other documents transcribed information of any type, whether expressed in ordinary or machine language.

(4) "Independent Certified Public Accountant" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his/her residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

(5) "Audit", when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a delineation to express an opinion for stated reasons.

(6) "Accountant's Report", when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which she/he has made and sets forth his/her opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of a financial condition of the contractor.

(7) "Management", when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

(8) Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principals and auditing standards.

(b) Subsection (a) (2) hereof notwithstanding, every agreement or contract awarded or executed pursuant to sections 30B through 30P, inclusive, of chapter seven, and pursuant to section 39M of chapter 30 or to section 44A through 44H, inclusive, of chapter 149, shall provide that:

(1) The contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

(2) until the expiration of six years after final payment, the awarding authority, office of inspector general, and the deputy commissioner of capital planning and operations shall have the right to examine any books, documents, papers or records of the contractor or of his/her subcontractors that directly pertain to, and involve transactions relating to, the contractor or his/her subcontractors, and

(3) if the agreement is a contract as defined herein, the contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his/her description the date of the change and reasons therefore, and shall accompany said description with a letter from the contractor's independent certified public accountant approving or otherwise commenting on the changes, and

(4) if the agreement is a contract as defined herein, the contractor has filed a statement of management on internal accounting controls as set forth in paragraph (c) below prior to the execution of the contract, and

(5) if the agreement is a contract as defined herein, the contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in paragraph (d) below.

(c) Every contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

(1) transactions are executed in accordance with management's general and specific authorization;

(2) transactions are recorded as necessary:

i. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

ii. To maintain accountability for assets;

(3) access to assets is permitted only in accordance with management's general or specific authorization; and

(4) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

Every contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that she/he has examined the statement of management on internal accounting controls, and expressing an opinion as to

(1) whether the representations of management in response to this paragraph and paragraph (b) above are consistent with the result of management's

evaluation of the system of internal accounting controls; and
(2) whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

(d) Every contractor awarded a contract by the commonwealth or by any political subdivision thereof shall annually file with the awarding authority during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by sub accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report.

(e) The office of inspector general, the deputy commissioner for capital planning and operations and any other awarding authority shall enforce the provisions of this section. The deputy commissioner of capital planning and operations may after providing an opportunity for the inspector general and other interested parties to comment, promulgate pursuant to the provisions of chapter thirty A such rules, regulations and guidelines as are necessary to effectuate the purposes of this section. Such rules, regulations and guidelines may be applicable to all awarding authorities. A contractor's failure to satisfy any of the requirements of this section may be grounds for disqualification pursuant to section forty-four C of Chapter one hundred forty-nine.

1.04 MINIMUM WAGE RATES

- A. Minimum Wage Rates as determined by the Commissioner of Department of Labor and Industries under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27D, as amended, apply to this project. It is the responsibility of the contractor, before bid opening, to request if necessary, any additional information of Minimum Wage Rates for those trades-people who may be employed for the proposed work under this contract. Minimum wage rates are included at the end of this section.
- B. Minimum Wage Rates as determined by the United States Department of Labor under the Davis-Bacon Act also apply to this project.

1.05 SAFETY AND HEALTH

- A. This project is subject to the Safety and Health regulation of the U.S. Department of Labor set forth in 29 CFR Part 1926, Commonwealth of Massachusetts Regulations CMR 454, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction operations (Chapter 454 CMR 10.00 et. seq.)". Contractors shall be familiar with the requirements of these regulations.

1.06 MODIFIED SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY NON-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

A. See Attached pages EEO-AAO-MS Page 1 through EEO-AAO-MS Page 7.

1.07 SPECIAL PROVISIONS FOR DISADVANTAGED BUSINESS ENTERPRISES

A. See Attached pages EEO-DEP-SP Page 1 through EEO-DEP-SP Page 9 AND EEO-DEP Forms.

1.08 STATUTES REGULATING CONSTRUCTION CONTRACTS FOR PUBLIC BUILDINGS AND PUBLIC WORKS PROJECTS

A. The following statutes regulating construction contracts for public buildings and public works projects are incorporated into the specifications. Where indicated, statutory references are included as attachments.

1. M.G.L c.30 s 39F Payment to Subcontractor (attached)
2. M.G.L c.30 s 39I Deviation from Plans and Specifications
3. M.G.L c.30 s 39J No Arbitrary Decisions are Final
4. M.G.L c.30 s 39L Construction Work by Foreign Corporations
5. M.G.L c.30 s 39M(b) Substitution of Equal Products
6. M.G.L c.30 s 39N Differing Site Conditions (attached)
7. M.G.L c.30 s 39O Equitable Adjustments for Delays (attached)
8. M.G.L c.30 s 39P Decision on Interpretation of Specifications
9. M.G.L c.30 s 39R Contractor's Records
10. M.G.L c.149 s 34 Limitations on Hours of Work
11. M.G.L c.149 s 44J Advertising Invitations to Bid
12. M.G.L c.82 s 40 Excavations; Notice; Penalties
13. M.G.L c.30 s 39K Prompt Payment
14. M.G.L c.149 ss44F and 44G

1.09 PROJECT SIGNAGE

- A. Project signs or other means of publicizing the project to comply with the "Guidelines for Enhanced Public Awareness of SRF Assistance Agreements" issued by the United States Environmental Protection Agency on June 3, 2015, or the "Guidelines for Implementing the Bipartisan Infrastructure Law Signage Term and Condition for the State Revolving Fund Programs" issued by the United States Environmental Protection Agency on December 8, 2022, as applicable, regarding the use of signs or other methods of enhancing awareness of SRF project.
- B. 2022 BIL guidance: <https://www.whitehouse.gov/wp-content/uploads/2022/08/Building-A-Better-America-Brand-Guide.pdf>
- C. 2015 guidance: https://www.epa.gov/sites/default/files/2016-07/documents/guidelines_for_enhancing_public_awareness_srf.pdf

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APPENDIX A
Certification Statements and
Excerpts from Massachusetts General Laws

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APPENDIX A1

Certification Statements wording required in the BID PROPOSAL of contracts bid under the provisions of c.30, s39M (Non-Building/Public Works Contract).

Pursuant to M.G.L. Ch. 62C, s49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all State Taxes Required under law.

C.30 s39 (c) The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work.

The undersigned bidder hereby certifies he/she will comply with the specific affirmative action steps contained in the Equal Employment Opportunity/Affirmative Action (EEO/AA) provisions of this Contract, including compliance with the Disadvantaged Business Enterprise provisions as required under these contract provisions. The contractor receiving the award of the contract shall incorporate the EEO/AA provisions of this contract into all subcontracts and purchase orders so that such provisions will be binding upon each subcontractor or vendor.

C.30 s39 (a) The undersigned certifies under penalties of perjury that this bid is in all respects bonafide, fair and made without collusion or fraud with any other person. As use in this paragraph the "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

Certification undersigned is not presently debarred from doing public construction work in the Commonwealth of Massachusetts under the provisions of Section Twenty-Nine F of Chapter Twenty-Nine, or any other applicable debarment provisions of any other Chapter of the General Laws or any rule or regulations promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

(Date)

(Name of General Bidder)

(Federal Employer Identification No.)

By:

(Signature)

(Title & Name of person signing bid)

(Business Address)

(City, State, Zip)

APPENDIX A2

Certification Statements wording required in the BID PROPOSAL of contracts bid under the provisions of c.149 s 44A – 44J (Building Contract with filed Sub-bids)

Pursuant to M.G.L. Ch. 62C, s 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all State Taxes Required under law.

The undersigned bidder hereby certifies he/she will comply with the specific affirmative action steps contained in the Equal Employment Opportunity/Affirmative Action (EEO/AA) provisions of this Contract, including compliance with the Disadvantaged Business Enterprise provisions as required under these contract provisions. The contractor receiving the award of the contract shall incorporate the EEO/AA provisions of this contract into all subcontracts and purchase orders so that such provisions will be binding upon each subcontractor or vendor.

The undersigned certifies under penalties of perjury that there have been no substantial changes in his financial position or business organization other than those changes noted within the application since the applicant's most recent pre-qualification statement and that the bid is in all respects bonafide, fair and made without collusion or fraud with any other person.

c149 s44D (1)(b) “Person” shall mean any natural person, joint venture, partnership, corporation or other business or legal entity which sells materials, equipment or supplies used in or for, or engages in the performance of, the same or similar construction, reconstruction, installation, demolition, maintenance or repair work or any part thereof.

c149 s44E (2) The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A.

c149 s44E (3) The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth of Massachusetts under the provision of Section Twenty-Nine F of Chapter Twenty-Nine, or any other applicable debarment provisions of any other Chapter of the General Laws or any rule or regulation promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

(Date) (Name of General Bidder) (Federal Employer Identification No.)

By: _____
(Signature)

(Title & Name of person signing bid)

(Business Address) (City State, Zip)

**GENERAL LAWS OF MASSACHUSETTS
PART I.
ADMINISTRATION OF THE GOVERNMENT.**

**TITLE III.
LAWS RELATING TO STATE OFFICERS.**

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES.

Chapter 30: Section 39F. Construction contracts; assignment and subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts.

Section 39F. (1) Every contract awarded pursuant to sections forty-four A to L, inclusive, of chapter one hundred and forty-nine shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M of chapter thirty shall contain the following subparagraphs (a) through (h) and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the subcontractor may demand direct payment of that balance from the awarding authority.

The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f),

are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

(i) If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g) and (h).

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) "Subcontractor" as used in this section (i) for contracts awarded as provided in sections forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (a) of section thirty-nine M of chapter thirty shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall also mean a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.

(4) A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the awarding authority and the general contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. Sections fifty-nine and fifty-nine B of chapter two hundred thirty-one shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections fifty-nine and fifty-nine B and, upon motion of any party, shall advance for speedy

trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the awarding authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the awarding authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1).

(5) In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any deposit of a disputed amount by the awarding authority as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1) any amount held under a trustee writ or pursuant to a restraining order or injunction.

**GENERAL LAWS OF MASSACHUSETTS
PART I.
ADMINISTRATION OF THE GOVERNMENT.**

**TITLE III.
LAWS RELATING TO STATE OFFICERS.**

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES.

Chapter 30: Section 39N. Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions.

Section 39N. Every contract subject to section forty-four A of chapter one hundred and forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

**GENERAL LAWS OF MASSACHUSETTS
PART I.
ADMINISTRATION OF THE GOVERNMENT.**

**TITLE III.
LAWS RELATING TO STATE OFFICERS.**

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES.

Chapter 30: Section 39O. Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; required provisions.

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

APPENDIX B

Massachusetts Diesel Retrofit Forms

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APPENDIX B DIESEL RETROFIT PROGRAM

The Department of Environmental Protection (“DEP”) has developed the Diesel Retrofit Program in response to increasing public health concerns with the emissions from diesel engines and vehicles.

Diesel Construction Equipment Standard

All diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract (hereinafter “Diesel Construction Equipment”) must have the following pollution control device installed unless exempt as provided below:

1. Emission control technology verified by U.S. Environmental Protection Agency (“EPA”) or the California Air Resources Board (“CARB”) for use with non-road engines;
2. Emission control technology verified by EPA or CARB for use with on-road engines provided that such equipment is operated with diesel fuel that has no more than 15 parts per million sulfur content (i.e. Ultra Low Sulfur Diesel fuel); or
3. Emission control technology certified by the manufacturer that such technology meets or exceeds the emission reductions provided by on-road or off-road emission control technology verified by EPA or CARB, i.e. that a Diesel Oxidation Catalyst is achieving the following minimum emission reductions: particulate matter 20%; carbon monoxide 40%; volatile organic compounds 50%; or a Diesel Particulate Filter is achieving a minimum of 85% emission reductions for particulate matter.

Emission control devices, such as oxidation catalysts or particulate filters, shall be installed on the exhaust system side of the Diesel Construction Equipment. The Contractor shall be responsible to insure that the emissions control technology is operated, maintained, and serviced as recommended by the manufacturer.

For the latest up-to-date list of EPA verified-technologies, see:

<https://www.epa.gov/verified-diesel-tech>

For the latest up-to-date list of CARB verified technologies, see:

<http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm>

Exemptions

The following Diesel Construction Equipment shall be exempt from the standard above. The Contractor shall include such Diesel Construction Equipment in the required recordkeeping:

1. Diesel Construction Equipment not owned by the Contractor and used in the performance of the work under this Contract for 30 calendar days (cumulative days but not necessarily consecutive) or less;
2. Unless otherwise exempt, additional Diesel Construction Equipment originally not anticipated to be used under the Contract or used as permanent replacement after the work under the Contract has commenced, for 15 calendar days from the date such Diesel Construction Equipment is brought on site;

**APPENDIX B (cont.)
DIESEL RETROFIT PROGRAM**

3. Diesel Construction Equipment with an engine that meets the EPA particulate matter (PM) Tier emission standards in effect at the start of the Contract for non-road diesel engines for the applicable engine power group (e.g., as of January 1, 2009, a piece of Diesel Construction Equipment with a Tier 3 engine is exempt from meeting the standard until the piece of Diesel Construction Equipment is available with a Tier 4 engine) provided that if such emissions standards are superseded during the Contract then such Diesel Construction Equipment must be retrofitted in accordance with the standards above prior to the end of the Contract;
4. A large crane (e.g. a sky crane or link belt crane which is responsible for critical lift operations) if such device would adversely affect the operation of the crane provided the Contractor submits to the municipality's project engineer written technical justification documenting the adverse impact on operation; and
5. Diesel Construction Equipment that the project engineer has determined is necessary to control a compelling emergency including but not limited to, the need for rescue vehicles or other equipment to prevent harm to human beings or additional equipment required to address a catastrophic emergency such as structure collapse or imminent collapse. After the compelling emergency is controlled, such non-compliant equipment must be removed from the Contract site and may not be used in further performance of the work under this Contract. Meeting Contract deadlines is not a compelling emergency.

Contractor Certification

Each bidder shall submit as part of its bid, the Statement of Intent to Comply. Within 10 days of being notified that it has been awarded a contract, the bidder and each of its Contractors and Subcontractors shall submit a Diesel Retrofit Program Contractor Certification. Each such Certification shall contain the following information for each piece of Diesel Construction Equipment:

1. Contractor or Subcontractor name;
2. Equipment type, make, model;
3. Vehicle Identification Number or VIN;
4. Engine model and year of manufacture;
5. Engine HP rating;
6. Emission Control Device (ECD) type (Diesel Oxidation Catalyst or Diesel Particulate Filter);
7. ECD make, model, and manufacturer;
8. ECD EPA or CARB Verification Number or manufacturer's certification that the DOC or DPF meets or exceeds emission reductions provided by similar emission control technology verified by EPA or CARB;
9. ECD installation date;
10. Type of fuel to be used; and
11. Whether the equipment is owned or rented.

Recordkeeping

Each Contractor and Subcontractor shall maintain detailed records of all Diesel Construction Equipment used under the Contract, including the dates and duration times the Diesel Construction Equipment is

APPENDIX B (cont.)
DIESEL RETROFIT PROGRAM

used at the Contract site. Records shall be available for inspection by DEP. Each Contractor and Subcontractor shall notify DEP within 48 hours of any new Diesel Construction Equipment brought onto the Contract site.

For Diesel Construction Equipment that has an emissions control device with a manufacturer's certification, the Contractor shall maintain records of all supporting emissions test data and test procedures. If upon review the emissions reductions are not supported by the test data and test procedures, then the emissions control device may need to be replaced with a compliant retrofit device.

Project Regulatory Agreement

The following language shall be included section 4 (Covenants of the Borrower) of the municipality's Project Regulatory Agreement if it receives funds from the State Revolving Fund:

The Borrower shall require each Contractor and Subcontractor to submit the Diesel Retrofit Program Contractor Certification to DEP and the Borrower prior to commencing work on the Project. The Borrower shall not allow any Contractor or Subcontractor to commence work at the Project site prior to submitting such Certification.

**APPENDIX B (cont.)
DIESEL RETROFIT PROGRAM**

STATEMENT OF INTENT TO COMPLY

This form must be signed and submitted by the bidder as part of the bid.

Local Governmental Unit _____ **SRF Project No.** _____

Contract No. _____ **Contact Title** _____

Bidder _____

The undersigned, on behalf of the above-named Bidder, agrees that, if awarded the Contract:

- 1. the Bidder shall comply with the Massachusetts Department of Environmental Protection's ("MassDEP") Diesel Retrofit Program by ensuring that all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard;**
- 2. the Bidder shall require all Subcontractors to comply with MassDEP's Diesel Retrofit Program by ensuring all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract are equipped or retrofitted with a pollution control device in accordance with the Diesel Retrofit Program Standard; and**
- 3. The Bidder shall submit and shall require each Subcontractor to submit a Diesel Retrofit Program Contractor Certification (form attached) with a Diesel Retrofit List to MassDEP Municipal Services and the Bidder within 10 days of the bidder being notified that it has been awarded the Contract. The Bidder shall require each Subcontractor to update such Certification and List within 2 days of using additional Diesel Construction Equipment on the project under the Contract.**

(Signature of Bidder's Authorized Representative)

(Date)

APPENDIX B (cont.)
DIESEL RETROFIT PROGRAM CONTRACTOR CERTIFICATION

Each Contractor and its Subcontractor(s) must sign and email this form to the DEP DMS project engineer, within 10 days after the contractor is awarded.

Local Governmental Unit _____ **SRF Project No.** _____

Contract No. _____ **Contact Title** _____

Contractor _____

I, _____, an authorized signatory for _____, whose principal place of business is at _____ do hereby certify that any and all diesel powered non-road construction equipment and vehicles greater than 50 brake horsepower which will be used in the performance of the work under the Contract (hereinafter "Diesel Construction Equipment") have pollution control devices, such as oxidation catalysts or particulate filters, installed on the exhaust system side of the diesel combustion engine equipment in accordance with the Diesel Retrofit Program Standard.

I am submitting on behalf of _____ a list of all said Diesel Construction Equipment, labeled "Diesel Retrofit List," that will be used in connection with this Contract by _____. I hereby certify that the information on the attached Diesel Retrofit List is correct and accurate as of the date of signature. The List includes the following information for each piece of Diesel Construction Equipment:

1. Equipment type, make, model;
2. Vehicle Identification Number or VIN;
3. Engine model and year of manufacture;
4. Engine HP rating;
5. Emission Control Device ("ECD") type (Diesel Oxidation Catalyst or Diesel Particulate Filter);
6. ECD make, model, and manufacturer;
7. ECD EPA or CARB Verification Number or manufacturer's certification that the DOC or DPF meets or exceeds emission reductions provided by similar emission control technology verified by EPA or CARB;
8. ECD installation date;
9. Type of fuel to be used; and
10. Whether the equipment is owned or rented.

APPENDIX B (cont.)

DIESEL RETROFIT PROGRAM CONTRACTOR CERTIFICATION

_____ shall notify DEP within 48 hours of any new Diesel Construction Equipment brought onto the Contract site. _____ shall maintain detailed records of all Diesel Construction Equipment used at the Contract site, including the dates and duration times the Diesel Construction Equipment is used at the Contract site. _____ shall make such records available for inspection by DEP. _____ shall ensure that the emissions control technology for each piece of Diesel Construction Equipment is operated, maintained, and serviced as recommended by the manufacturer. _____ shall retrofit prior to the end of the Contract any Diesel Construction Equipment no longer exempt from meeting the Diesel Construction Equipment Standard under exemption 3 (because it had an engine that met the EPA particulate matter (PM) Tier emission standards currently in effect at the start of the Contract for non-road diesel engines for the applicable engine power group and such emissions standards were superseded during the Contract).

I acknowledge that this certificate is being furnished as a requirement under this Contract and is subject to applicable State and federal laws, both criminal and civil. Signed under pains and penalty of perjury on this date _____.

Signature _____

Name: _____

Title: _____

APPENDIX E

Massachusetts Equal Employment Opportunity Package

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APPENDIX E
CONSTRUCTION BID SPECIFICATIONS
SPECIAL PROVISIONS FOR DISADVANTAGED BUSINESS ENTERPRISES
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF MUNICIPAL SERVICES

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM BACKGROUND

In May 2008 a United States Environmental Protection Agency (EPA) rule became effective that changed the Minority Business Enterprise (MBE) and Women Business Enterprise (WBE) Program to a Disadvantaged Business Enterprise (DBE) Program.

For firms to qualify under the old MBE/WBE program they needed to be socially disadvantaged and had to be certified by the Supplier Diversity Office (SDO). Under the new DBE rule, the firms must be both **socially** and **economically** disadvantaged, **citizens of the United States**, and certified as a DBE. Women and certain minorities are presumed to be socially disadvantaged. The economic disadvantage is measured by the owner's initial and continuing personal net worth of less than \$1,320,000.

Because the Clean Water Act requires the use of MBEs and WBEs, these firms will still be utilized in the State Revolving Fund (SRF) Loan Program, but they must also be certified as DBEs.

SDO will continue to be the certifying agency for the SRF program. SDO certifies firms under the federal Department of Transportation program, which is acceptable for use in the SRF program. An additional form has been added to the DBE package to verify that DBEs are owned or controlled by United States citizens.

BID SPECIFICATIONS

I. In this contract, the percentage of business activity to be performed by disadvantaged business enterprise(s) (DBE) shall not be less than the following percentages of the total contract price or the percentage submitted by the contractor in the Schedule of Participation, whichever is greater:

Disadvantaged MBE (D/MBE) 6.7%

Disadvantaged WBE (D/WBE) 7.2%

II. DEFINITIONS

For the purpose of these provisions, the following terms are defined as follows:

- A. Awarding Authority – Entity that awards a prime contract under a State Revolving Fund loan.
- B. Bidder - Any individual, partnership, joint venture, corporation, or firm submitting a price, directly or through an authorized representative, for the purpose of performing construction or construction related activities under a Contract.
- C. Certified DBE – A DBE certified by the United States Small Business Administration, under its 8(a) Business Development Program (13 CFR part 124, subpart A) or its Small Disadvantaged Business Program (13 CFR part 124, subpart B); The United States Department of Transportation (DOT), under its regulations for Participation by DBEs in DOT programs (49 CFR parts 23 and 26); or SDO in accordance with 40 CFR part 33; provided that the certification meets the U.S. citizenship requirement under 40 CFR §33.202 or §33.203.
- D. Compliance Unit - A subdivision of MassDEP’s Affirmative Action Office designated to ensure compliance under these provisions.
- E. Contractor - Any business that contracts or subcontracts for construction, demolition, renovation, survey, or maintenance work in the various classifications customarily used in work and that is acting in this capacity under the subject contract.
- F. Construction Related Services - Those services performed at the work site ancillary to, and/or in support of, the construction work, such as hauling, trucking, equipment operation, surveying or other technical services, etc. For the purposes hereof, supply and delivery of materials (e.g. pre-cast concrete elements) to the site by a supplier who has manufactured those goods, or substantially altered them before re-sales shall be considered as “construction related services
- G. Construction Work - The activities at the work site, or labor and use of materials in the performance of constructing, reconstructing, erecting, demolishing, altering, installing, disassembling, excavating, etc, all or part of the work required by the Contract Documents.
- H. Disadvantaged Business Enterprise (DBE) - An entity owned or controlled by a socially and economically disadvantaged individual as described by Public Law 102-389 (42 U.S.C. 4370d) or an entity owned and controlled by a socially and economically disadvantaged individual as described by Title X of the Clean Air Act Amendments of 1990 (42 U.S.C. 7601 note); a Small Business Enterprise (SBE); a Small Business in a Rural Area (SBRA); or a Labor Surplus Area Firm (LAF), a Historically Underutilized Business (HUB) Zone Small Business Concern, or a concern under a successor program.

- I. Equipment Rental Firm - A firm that owns equipment and assumes actual and contractual responsibility for renting said equipment to perform a useful function of the work of the contract consistent with normal industry practice
- J. Good Faith Efforts – The race and/or gender neutral measures described in 40 CFR 33, subpart C.
- K. HUBZone - A historically underutilized business zone, which is an area located within one or more qualified census tracts, qualified metropolitan counties, or lands within the external boundaries of an Indian reservation.
- L. HUBZone small business concern - A small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.
- M. Joint Venture - An agreement between SDO certified DBE and a non-DBE or non-DBE controlled enterprise.
 - 1. A pairing of companies will be considered a DBE joint venture if the SDO certified DBE which is part of the relationship has more than 51% of the profits that are derived from that project.
 - 2. A joint venture between a certified DBE subcontractor and a non DBE subcontractor, in which the DBE for that proportion of the joint venture’s contract equal to the DBE participation in the joint venture.
 - 3. Whenever a general bid is filed by a joint venture with a certified DBE participant in the joint venture that does not exercise more than 51% control over management and profits, that joint venture shall be entitled to credit as a DBE for that portion of the joint venture’s contract equal to the DBE participation in the joint venture. Minority As deemed by SDO.
- N. Labor surplus area firm (LSAF) - A concern that together with its first-tier subcontractors will perform substantially in labor surplus areas (as identified by the Department of Labor in accordance with 20 CFR part 654). Performance is substantially in labor surplus areas if the costs incurred under the contract on account of manufacturing, production or performance of appropriate services in labor surplus areas exceed 50 percent of the contract price.
- O. Letter of Intent – Certified document signed by the principal(s) of the DBE with respect to the work to be performed under contract.
- P. Local Government Unit (LGU) – A city, town, or municipal district which applies for a loan under the Clean Water Trust Program.
- Q. Material Supplier – A vendor certified by SDO as a DBE in sales to supply industry from an established place of business or source of supply, and that vendor.

1. Manufactures goods from raw materials, or substantially utilizes them in the work, or substantially alters them before resale, entitling the general contractor to DBE credit for 100% of the purchase order.
 2. Provides and maintains a storage facility for materials utilized in the work, entitling the general contractor to DBE credit for 10% of the purchase order
- R. Minority and Women Business Enterprise (M/WBE) – Any business concern certified by the SDO as a bona-fide M/WBE. A bona-fide M/WBE is a business whose minority group/women ownership interests are real, which have at least 51% ownership and control over management and operation.
- S. Percent of Total Price – Is the percentage to be paid to the DBE, work they perform, as compared to the total bid price
- T. Recipient - An agency, person or political subdivision which has been awarded or received financial assistance by the Trust or MassDEP.
- U. Small business, small business concern or small business enterprise (SBE) - A concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR part 121.
- V. Small business in a rural area (SBRA) - A small business operating in an area identified as a rural county with a code 6-9 in the Rural-Urban continuum Classification Code developed by the United States Department of Agriculture in 1980.
- W. SDO – The Supplier Diversity Office.
- X. Subcontractor – A company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an award of financial assistance.
- Y. Total Contract Price – The total amount of compensation to be paid for all materials, work or services rendered in the performance of the contract
- Z. Trust – The Massachusetts Clean Water Trust established by M.G.L. c.29.

III. REQUIREMENTS FOR CONTRACT AWARD

DBE packages must be submitted by the two lowest bidders on the project. Following bid opening, the LGU shall notify the two lowest bidders to submit DBE packages to the LGU or the LGUs consultant, as directed. By the close of business on the third business day after notification, the two lowest bidders, including a bidder who is a MBE, WBE or DBE, shall submit the following information:

- A. A Schedule of Participation (Form EEO-DEP-190). The Schedule of Participation shall list those certified DBEs the bidder intends to use in fulfilling the contract obligations, the nature of the work to be performed by each certified DBE subcontractor and the total price they are to be paid.
 - 1. A listing of bona-fide services such as a professional, technical, consultant or managerial services, assistance in the procurement of essential personnel, facilities, equipment, materials, or supplies required for performance of the contract, and reasonable fees or commissions charged.
 - 2. A listing of haulers, truckers, or delivery services, not the contractors, including reasonable fees for delivery of said materials or supplies to be included on the project.
- B. A Letter of Intent (Form EEO-DEP-191) for each DBE the bidder intends to use on the project. The Letter of Intent shall include, among other things, a reasonable description of the work the certified DBE is proposing to perform and the prices the certified DBE proposes to charge for the work. A Letter of Intent shall be jointly signed by the certified DBE and the General Contractor who proposes to use them in the performance of the Contract.
- C. Each DBE must also sign and return the DBE Certification of United States Citizenship form to verify that the firm is owned or controlled by a United States citizen.
- D. The SDO "DBE Certification" as prepared by each certified DBE.
- E. A completed Request for Waiver form and backup documentation should the goals not be achieved (See IV below).

IV. REQUIREMENTS FOR MODIFICATION OR WAIVERS.

The bidder shall make every possible effort to meet the minimum requirements of certified DBE participation. If the percentage of DBE participation submitted by the bidder on its Schedule of Participation (EEO-DEP-190) does not meet the minimum requirements, the bid may be rejected by the Awarding Authority and found not to be eligible for award of the contract.

In the event that the bidder is unable to meet the minimum requirements of DBE participation, the bidder shall submit with his/her submittal required in Section III. Requirement of Contract Award a Request for Waiver form (EEO-DEP-490). The Awarding Authority shall review the waiver request to determine if the request should proceed. If approved by the Awarding Authority, the Awarding Authority shall submit the waiver request and supporting documentation, with a recommendation to MassDEP within five days of receipt of the Request for Waiver. MassDEP in conjunction with the project manager, Compliance Unit, will determine whether the waiver will be granted.

The waiver request shall include detailed information as specified below to establish that the bidder has made a good faith effort to comply with the minimum requirements of DBE participation specified in Part I. In addition, the bidder must show that such efforts were undertaken well in advance of the time set for opening of bids to allow adequate response. A waiver request shall include the following:

- A. A detailed record of the effort made to contact and negotiate with the certified DBE, including, but not limited to:
 - 1. names, addresses and telephone numbers of all such companies contacted;
 - 2. copies of written notices(s) which were sent to certified DBE potential subcontractors, prior to bid opening;
 - 3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and
 - 4. in the case(s) where a negotiated price could not be reached the bidder should detail what efforts were made to reach an agreement on a competitive price;
 - 5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/ women-focused media detailing the opportunities for participation.
- B. MassDEP may require the bidder to produce such additional information as it deems appropriate.
- C. No later than fifteen (15) days after MassDEP receives all required information and documentation, it shall make a decision in writing, whether the waiver is granted and shall provide that determination to the bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing. If the waiver request is denied, the bid shall be rejected by the Awarding Authority, or the contract will be determined ineligible for SRF funding.

If a Request for Waiver is denied by MassDEP and the bid is rejected by the Awarding Authority, the Awarding Authority may then move to the second bidder on the project. At the Awarding Authority's discretion, it may collect a DBE package from the third bidder on the project.

V. DISADVANTAGED BUSINESS ENTERPRISES PARTICIPATION

A. Reporting Requirements

1. The Contractor's utilization of certified DBEs will be documented based upon submittal of the LGU's monthly Payment Requisitions as reported on Form-2000. The Form-2000 form will show all certified DBEs performing work on the project regardless of any billing activity for that month. For auditing and accounting purposes, the Contractor periodically may be required to submit copies of canceled checks verifying that payments have been made to the certified DBE as listed on the schedule. The Contractor may also be required to submit current schedules on utilization of all DBEs to indicate when their services will commence and be billed for.
2. During the life of the Contract, the Contractor's fulfillment of the percentage requirements in Part I shall be determined with reference to the Contract price as follows:
 - A. If the price in the Contract executed exceeds the base bid price (e.g., because an alternate was selected or because unit prices were used in awarding the Contract), the Contractor shall submit for approval by MassDEP a revised Schedule of Participation by certified DBEs satisfying the percentage requirements and such other information concerning additional DBE participation as may be requested by MassDEP.
 - B. If the Contract price increases after execution due to change orders or other adjustments, MassDEP may require the Contractor to subcontract additional work or to purchase additional goods and services from certified DBEs up to the percentages stated in Part I.

VI. COMPLIANCE

- A. If the Schedule or any of the Letters of Intent are materially incomplete or not submitted in a timely manner, the LGU may rescind its vote of award; treat the bid informal as to substance and reject the bid. If the bid is incomplete in any other respect than the Schedule the LGU with the approval of MassDEP may waive the informalities upon satisfactory completion of the required information by the Contractor and the certified DBE as applicable.
- B. If the LGU finds that the percentage of certified DBE participation submitted by the contractor on its Schedule does not meet the percentage requirement in Part I, it shall rescind its vote of award and find such contractor not to be eligible for award of the contract.

- C. The Contractor shall not perform with its own organization, or subcontract to any other primary or subcontractor any work designated for the named certified DBEs on the schedule submitted by the Contractor under Part III without the approval of MassDEP.
- D. A Contractor's compliance with the percentage requirement in Part I shall continue to be determined by reference to the required percentage of the total contract price as stated in Section I even though the total of actual contract payments may be greater or less than the bid price.
- E. If the Contractor for reasons beyond its control cannot comply with Part III in accordance with the Schedule submitted under Part III, Section B, the contractor must submit to MassDEP as soon as they are aware of the deficiency, the reason for its inability to comply. Proposed revisions to the Schedule stating how the contractor intends to meet its obligations under these conditions must be submitted within ten (10) working days of notification.
- F. If the Contractor becomes aware by any means that that DBE is no longer certified, the Contractor shall immediately notify MassDEP. The Contractor shall use good faith efforts to retain a substitute certified DBE.
- G. If a certified DBE listed by the bidder in its Schedule of M/WBE contractors fails to obtain a performance or payment bond requested by the bidder, said failure shall not entitle the bidder to avoid the requirements of Part III (A). After a bidder has been awarded the contract, he shall not change the certified DBE listed in its Schedule at the time of the award or make any other such substitutions without the written approval of MassDEP.

VII. SANCTIONS

- A. If the Contractor does not comply with the terms of these Special Provisions, the Awarding Authority may (1) suspend any payment for the work that should have been performed by a certified DBE pursuant to the schedule, or (2) require specific performance of the Contractor's obligation by requiring the Contractor to subcontract with a DBE for any contract or specialty item at the contract price established for that item in the proposal submitted by the Contractor.
- B. To the extent that the Contractor has not complied with the terms of these Special Provisions, the Awarding Authority may retain in connection with Estimates and Payments an amount determined by multiplying the bid price of this contract by the percentage in Section I, less the amount paid to DBE's for work performed under the contract and any payments already suspended under VII A.
- C. The Awarding Authority may suspend, terminate or cancel this contract, in whole or in part, or may call upon the Contractor's surety to perform all terms and conditions in the contract, unless the contractor is able to demonstrate his compliance with the terms

of these Special Provisions, and further deny to the Contractor, the right to participate in any future contracts awarded by the Awarding Authority for a period of up to three years.

- D. In any proceeding involving the imposition of sanctions by the Awarding Authority, no sanctions shall be imposed if the Awarding Authority finds that the contractor has taken every possible measure to comply with these Special Provisions or that some other justifiable reason exists for waiving these Special Provisions in whole or in part.
- E. The contract shall provide such information as is necessary in the judgment of the Awarding Authority to ascertain its compliance with the terms of these Special Provisions.
- F. A contractor shall have the right to request suspension of any sanctions imposed under this section upon demonstrating that he is in compliance with these Special Provisions.

DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION
 MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
 DIVISION OF MUNICIPAL SERVICES

SCHEDULE OF PARTICIPATION FOR SRF CONSTRUCTION

Project Title: _____ **Project Location:** _____

Disadvantaged Minority Business Enterprise Participation in the SRF Loan Work

Name & Address of D/MBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
Total D/MBE Commitment:		\$
Percentage D/MBE Participation = (Total D/MBE Commitment) / (Bid Price) =		%

Disadvantaged Women Business Enterprise Participation in the SRF Loan Work

Name & Address of D/WBE	Nature of Participation	Dollar Value of Participation
1.		
2.		
3.		
Total D/WBE Commitment:		\$
Percentage D/WBE Participation = (Total D/WBE Commitment) / (Bid Price) =		%

The Bidder agrees to furnish implementation reports as required by MassDEP to indicate the D/MBEs and D/WBE(s) which it has used or intends to use. Breach of this commitment constitutes a breach of the contract.

Name of Bidder: _____

Date: _____ By: _____
Signature

NOTE: Participation of a DBE may be counted in only their certified category; the same dollar participation cannot be used in computing the percentage of D/MBE participation and again of D/WBE participation.

DBE CERTIFICATION OF UNITED STATES CITIZENSHIP

For the SRF program, under the EPA Disadvantage Business Enterprise (DBE) Rule, a DBE must be owned or controlled by a socially and economically disadvantaged person that is also a **citizen of the United States** (See 40 CFR 33.202). “Ownership” is defined at 13 CFR 124.105 and “control” is defined at 13 CFR 124.106.

DBEs are certified for the SRF program through the Supplier Diversity Office using the federal Department of Transportation (DOT) DBE rules. EPA allows the use of DBEs certified under the DOT rules as long as they are also United States citizens. To ensure compliance with the EPA rule, MassDEP must verify United States citizenship through the completion of the following form for each DBE used on the project.

SRF Project Number _____

Contract Number _____

Contract Title _____

DBE Subcontractor _____

The undersigned, on behalf of the above named DBE subcontractor, hereby certifies that the DBE firm is either owned or controlled by a person or persons that are citizens of the United States.

Printed Name and Title of DBE Signatory

DBE Signature

Date

DISADVANTAGED BUSINESS ENTERPRISE
PROGRAM DBE SUBCONTRACTOR PARTICIPATION
FORM

The United States Environmental Protection Agency (EPA) requires that this form be provided to all subcontractors on the project. At the option of the subcontractor, this form may be filled out and submitted directly to the EPA DBE Coordinator.

NAME OF SUBCONTRACTOR	PROJECT NAME
ADDRESS	CONTRACT NO.
TELEPHONE NO.	E-MAIL ADDRESS
PRIME CONTRACTOR NAME:	

Please use the space below to report any concerns regarding the above EPA-funded project (e.g., reason for termination by prime contractor, late payment, etc.).

CONTRACT ITEM NO.	ITEM OF WORK OR DESCRIPTION OF SERVICES RECEIVED FROM THE PRIME CONTRACTOR	AMOUNT SUBCONTRACTOR WAS PAID BY PRIME CONTRACTOR
_____ Subcontractor Signature		_____ Title/Date

REQUEST FOR WAIVER FOR SRF CONSTRUCTION

Upon exhausting all known sources and making every possible effort to meet the minimum requirements for DBE participation, the Bidder may seek relief either partially or entirely from these requirements by submitting a completed waiver package by the close of business on the third business day after notification by the LGU. Failure to comply with this process shall be cause to reject the bid thereby rendering the Bidder not eligible for award of the contract.

General Information

Project Title: _____ Project Location: _____

Bid Opening (time/date) _____

Bidder: _____

Mailing Address: _____

Contact Person: _____ Telephone No. _____

Minimum Requirements

The bidder must demonstrate that good faith efforts were undertaken to comply with the percentage goals as specified. The firm seeking relief must show that such efforts were taken appropriately in advance of the time set for opening bid proposals to allow adequate time for response(s) by submitting the following:

- A. A detailed record of the effort made to contact and negotiate with disadvantaged minority and/or woman owned businesses, including:
 - 1. names, addresses, telephone numbers and contact dates of all such companies contacted;
 - 2. copies of written notice(s) which were sent to DBE potential subcontractors prior to bid opening;
 - 3. a detailed statement as to why each subcontractor contacted (i) was not willing to do the job or (ii) was not qualified to perform the work as solicited; and
 - 4. in the case(s) where a negotiated price could not be reached the bidder should detail what efforts were made to reach an agreement on a competitive price.
 - 5. copies of advertisements, dated not less than ten (10) days prior to bid opening, as appearing in general publications, trade-oriented publications, and applicable minority/women-focused media detailing the opportunities for participation;

- B. MassDEP may require the bidder to produce such additional information as it deems appropriate.
- C. No later than fifteen (15) days after submission of all required information and documentation, MassDEP shall make a determination, in writing, whether the waiver request is granted and shall provide that determination to the bidder and Awarding Authority. If the waiver request is denied, the facts upon which a denial is based will be set forth in writing.

CERTIFICATION

The undersigned herewith certifies that the above information and appropriate attachments are true and accurate to the best of my knowledge and that I have been authorized to act on behalf of the bidder in this matter.

(authorized original signature)

DATE

APPENDIX F

Division of Municipal Services Policies

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APPENDIX F

DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WATER RESOURCES DIVISION OF MUNICIPAL SERVICES POLICIES

The Division of Municipal Services (DMS) has established the following policies for all Division financially-assisted projects.

POLICY MEMORANDUM NO. PM-1

EASEMENTS AND RIGHTS OF WAY

Prior to the approval of financial assistance for construction, the owner shall obtain and shall thereafter retain, a fee simple or such estate or interest in the site of construction and rights of access as will assure undisturbed use and possession for the purpose of construction and operation for the estimated life of the project. The Division may refuse to approve financial assistance until it has received from the owner sufficient assurances that such interests have been obtained. Unless the Division otherwise notifies the owner, the certificate (under pains and penalties of perjury) of the owner's legal representative shall constitute such sufficient assurance.

Additional cost which result from interruptions of construction or extensions of contract time caused by the owner's failure to obtain the necessary interests in land shall be ineligible for financial assistance, and all such additional costs shall be borne by the owner.

POLICY MEMORANDUM NO. PM-2

PERMITS

The owner shall be responsible for identifying and obtaining all federal, state, local and railroad permits required by the nature and location of construction, including but not limited to building construction permits and permits for street and highway cuts and openings, and all such permits shall be listed in a separate permits section of the contract documents. To the extent possible, such permits shall be obtained by the owner prior to the solicitation of bids for construction, and copies of all permits so obtained shall be included in the said permits section. The status of the application for each permit, including the permit conditions, and costs, not obtained prior to the solicitation of bids shall also be indicated in the contract documents permits section. The Division may refuse to approve financial assistance for construction unless and until it has received from the owner sufficient assurances that all necessary permits have been or will be obtained prior to the commencement of construction.

Policy Memorandum No. PM-2 – Permits (Con't)

The contractor shall be responsible for obtaining all permits required of his equipment, work force, or particular operations (such as blasting) in the performance of the contract and not otherwise specified in the two preceding paragraphs as to be obtained by the owner. These permit fees shall be paid by the contractor.

The owner shall be responsible for the payment of all other permit fees required by the construction.

The following permits shall not be eligible for financial participation by the Department of Environmental Protection (DEP).

- Permits and insurance for construction in railroads' rights of way;
- Building permits;
- Permits for opening public streets and other public or municipal rights of way;
- Permits for the use of explosives;
- Permits for the disposal of waste materials;
- Permits and fees for connecting to municipal utilities.

Permits required by extraordinary circumstances and not specifically excluded from eligibility above may be eligible for DEP participation. For such permits to be so eligible, the owner or his representative must notify the DEP project engineer in advance of obtaining such permit and receive from the engineer specific agreement that such permit will be eligible for DEP participation. Eligibility for such participation will not be made retroactively.

Additional costs which result from interruptions of construction or extensions of contract time resulting from the owner's or the contractor's failure to obtain the necessary permits may be ineligible for participation.

POLICY MEMORANDUM NO. PM-3

FIELD CONTROLS

The Owner shall be responsible for indicating on the contract drawings all easement limits and all property and other control lines for locating the principal component parts of the work together with those elevations and bench marks used in the design of the work, all hereinafter referred to as "field controls". Where easement and property limits have not previously been established in the field, the owner shall be responsible for establishment of such limits. From the information provided by the Owner, unless otherwise specified, the Contractor shall develop and make all layouts required for construction, such as slope stakes, batter boards, stakes for pipe locations and other working points, lines, elevations and cut sheets.

Whenever he has reason to believe that an error exists or whenever he is otherwise unable to locate the field controls, the contractor shall promptly notify the owner and the owner's engineer of such error with appropriate documentation.

POLICY MEMORANDUM NO. PM-4**RECORD DRAWINGS**

The Owner shall be responsible for the preparation of all record drawings required by this contract. This responsibility may be delegated to the Owner's representative. The responsibility for preparation of record drawings shall not be delegated or transferred to the contractor. They may use the contractor's and sub-contractor's certified AS BUILT drawings along with their own marked up set in the preparation of the Record Drawings.

Division approved contract drawings shall be revised upon completion of the contract to reflect any changes made and/or final quantities, as appropriate.

POLICY MEMORANDUM NO. PM-5**PLAN SCALE**

Unless otherwise approved in advance by the Division, the horizontal scale for construction plans for non-structural facilities shall be 1" = 40'. A larger horizontal scale shall be used where appropriate to show sufficient detail to construct the project. The vertical scale for construction plans for non-structural facilities shall be 1" = 4'. Based on the best information available at the time of their preparation, the location of underground utilities and support structures for overhead utilities shall be shown on the plans.

Unless otherwise exempted in advance by the Division, construction plans shall be updated whenever the date of the advertisement for bids for the construction of such facilities is more than one year after the date of approval by the Division or EPA; and in the case of approval by both such agencies, the later approval date shall be used in determining the need for update.

The consulting engineer shall receive adequate compensation for updating plans and specifications, and such additional cost shall be eligible for assistance to the extent not otherwise prohibited by USEPA and Division regulations and program guidance.

All revision, or review without need for revision, shall be noted and dated on the plans prior to advertisement of the project for bid.

POLICY MEMORANDUM NO. PM-6**BORINGS LOGS**

All soil borings shall be taken as close as practicable to the construction line, and the location of all such borings shall be clearly indicated on the contract drawings. The plan view shall show the location and boring number of each boring. The profile view shall show the location, elevation, and depth of each soil boring, the location of each change in soil stratum, the groundwater level, and the average of blow counts at each five foot interval. As a minimum, boring logs to be submitted with the plans and specifications shall show the name of the company taking the borings, the soil classification, the number of blows per foot of penetration, the groundwater elevation, and the date on which the borings were taken.

As part of the submission of plans and specification for approval, the owner's representative shall include written justification for the lesser frequency and depth of borings where their interval is more than approximately 300' or their depth is less than 50% below depth of pipe invert.

POLICY MEMORANDUM NO. PM-7

BREAKDOWN OF BID ITEMS

The following items shall, where applicable, be listed separately in the bid documents.

- 1. Mobilization
- 2. Pavement
 - a. Municipal
 - i. temporary
 - ii. permanent
 - b. State
 - i. temporary
 - ii. permanent
- 3. Concrete cradle or encasement
(to be identified where applicable)
- 4. Rock-Excavation
- 5. Wood or steel sheeting left in place
- 6. Excavation of unsuitable materials below grade.
- 7. Select and/or borrow material
- 8. Dewatering
- 9. Special Dewatering (coffer dam)

Mobilization costs are the costs of initiating the contract, exclusive of the cost of materials. Payment for mobilization shall be a lump sum at the price bid for this item in the proposal and shall be payable when the contractor is operational on the site. For purposes of this policy, “operational” shall mean the substantial commencement of work on site.

The lump sum price bid for mobilization shall not exceed five per centum (5%) of the total amount of the bid.

POLICY MEMORANDUM NO. PM-8

PAVEMENT

All roads and trenches therein shall be refilled and repaved in accordance with specifications provided by the owner in the contract documents. Please note that this policy may be excludable on federally assisted projects where bid alternative items may be required (i.e. trench width vs. full width pavement). You are advised to seek project specific clarification.

Loan eligibility shall be limited to the following:

- A. Where the depth of the pipe invert is 0 to 8’, the maximum pavement widths which shall be eligible for financial assistance are as follows:

<u>Nominal Pipe Diameter</u>	<u>Maximum Eligible Widths</u>	
	<u>Initial Pavement</u>	<u>Permanent Trench</u>
0-24”	6’-6”	8’-6”

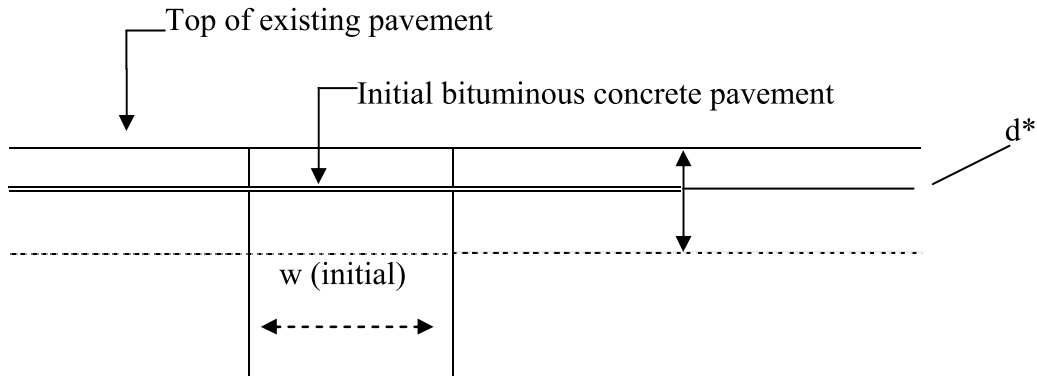
Where the nominal pipe diameter is greater than 24” the maximum eligible width for initial re-paving shall be the nominal diameter of the pipe plus four (4) feet, and for permanent trench re-paving the maximum eligible width shall be the nominal pipe diameter plus six (6) feet.

- B. For each additional four (4) feet (or fraction thereof) of pipe invert depth, add three feet to the eligible width limits stated in paragraph A.

Policy Memorandum No. PM-8 – Pavement (Con't)

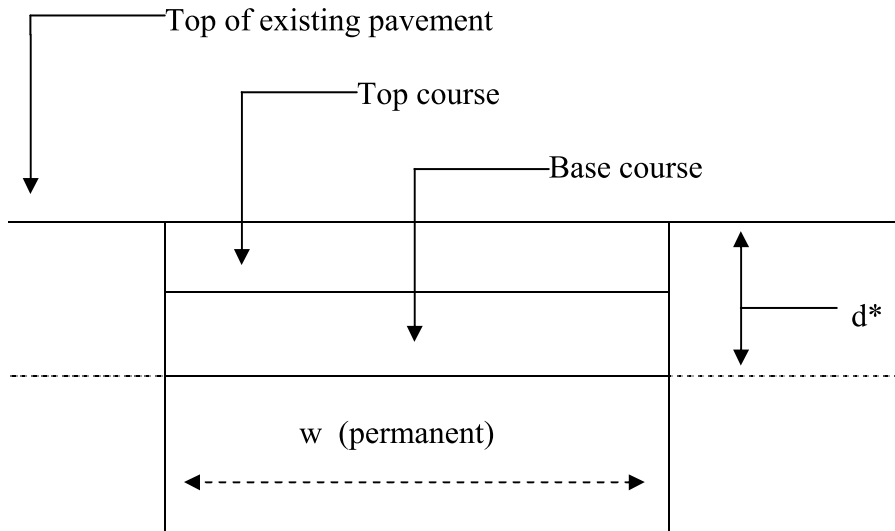
At the design phase of a project the owner has the option to elect either Initial Pavement with Option I (Permanent Trench replacement) or Initial with Option II (curb to curb over initial)

Initial Pavement



d* = depth of existing pavement to a maximum of 3 inches (see general notes #3)
w = maximum eligible Initial pavement width as described in paragraphs "A" & "B" on page DEP-DMS-CG's-P4.

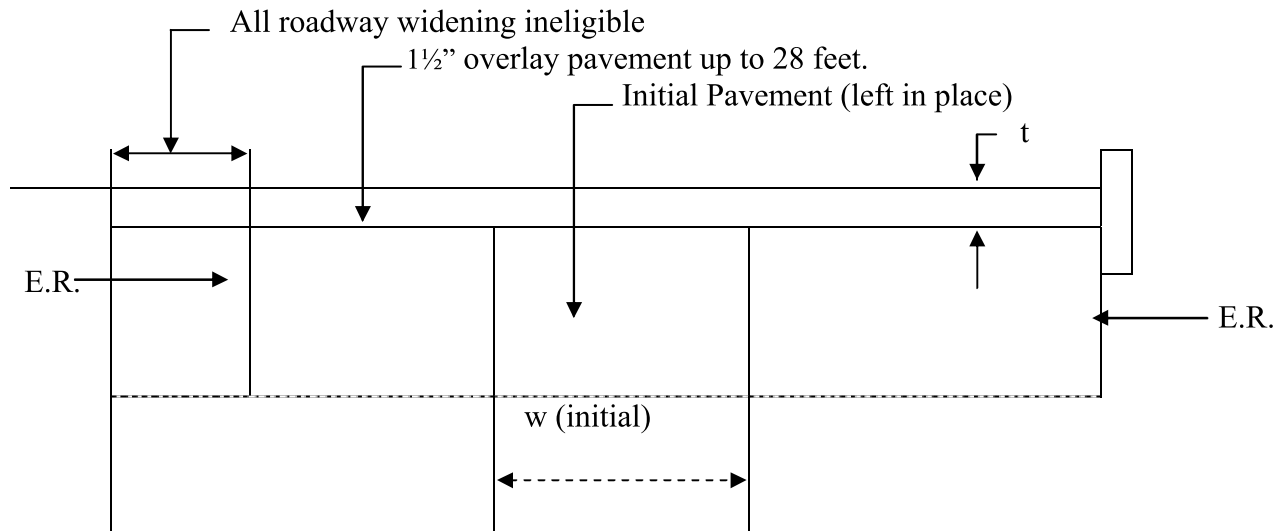
OPTION I Permanent Trench Pavement



d* = depth of existing pavement trench to a maximum of 3 inches (see general notes #3)
w = maximum eligible permanent pavement width as described in paragraphs "A" & "B".
equals initial width plus 2 feet and includes:

- Cutting edges for the permanent trench
- Removal of initial patch plus two feet of existing pavement
- Fine grading/compacting gravel
- Placement of Permanent Trench pavement in two courses.

OPTION II Curb to Curb Pavement (overlay pavement for roadways up to 28 feet)



E.R.= edge of existing paved roadway

t = one and one half inch (1 1/2") overlay of bituminous concrete pavement

GENERAL NOTES:

1. Repavement of settled areas and crown restoration within the trench limits shall be the responsibility of the contractor.
2. Leveling outside the trench limits shall be the responsibility of the owner.
3. Sewer trench re-fill and pavement re-paving on public ways under the jurisdiction of the Massachusetts Department of Public Works, the Metropolitan District Commission, or other such agency shall be in accordance with permit(s) issued therefore by that Department or Commission, as the case may be.
4. The Division will consider requests for increase in the participating pay limits defined in paragraphs A and B, when such increases are, in the Division's opinion, reasonable. Such requests should be documented in writing and submitted to the Division in a timely manner.
5. Projects which deviate from the above options are required to seek Division review and approval.

POLICY MEMORANDUM NO. PM-9

PIPE TESTING

Monthly payment estimates shall be prepared in accordance with contract documents. All pipe shall be tested in accordance with the contract documents and sound engineering practice. If, after 60 days following submission of a monthly payment estimate for pipe items, the pipe for which payment is requested has not been successfully tested, the owner may withhold up to 10% of the amount requested for such pipe items until the pipe has been so tested. However, in the case of a major (pipe diameter 24 inches or greater) interceptor pipe installation, sums retained by the owner pursuant to this policy memorandum shall not exceed two per centum (2%) of the costs of such pipe items.

POLICY MEMORANDUM NO. PM-10

CHANGE ORDERS

Executed change orders submitted to the Division for review and processing for financial assistance must be prepared on the attached Change Order Forms (PM-10, Attachment 1, pages A-1 & A-2) with a duplicate copy, calculation sheet(s) (PM-10, Attachment 2), and all other supporting documentation necessary for evaluation. Failure to comply with these instructions will result in delays in processing the change order and/or limited financial assistance.

M.G.L. c.44, s.31C requires that the auditor, accountant, or other municipal officer having similar duties must certify that adequate funding in an amount sufficient to cover the total cost of the change order has been made. Change orders will not be processed or approved until this certification is made on the face of the Change Order Form (PM-10 Attachment 1).

Payment of Change Orders:

Payment of all change orders shall be in accordance with the relevant provisions of Massachusetts General laws, Chapter 30, Section 39G for non-building construction and Section 39K for building construction.

Payment of change orders shall be made in accordance with one of the following three methods:

- A. Existing unit prices as set forth in the contract; or
 - B. Agreed upon lump sum or unit prices; or
 - C. Time and materials
- A. Payment for work for which there is a unit price in the contract:

Where the contract contains a unit price for work and the Engineer orders a change for work of the same kind as other work contained in the contract and is performed under similar physical conditions, the contractor may accept full and final payment at the contract unit price(s) for the acceptable quantities.

Policy Memorandum No. PM-10 – Change Orders (Con't)

B. Payment for work or materials for which no price is contained in the contract:

If the Engineer directs, the contractor shall submit promptly in writing to the Engineer and offer to do the required work on a lump sum or unit price basis, as specified by the Engineer. The stated price, either lump sum or unit price, shall be divided so as to show that it is the sum of:

- (1) The estimated cost of labor, plus
- (2) Direct Labor Cost, plus
- (3) Material and Freight Costs, plus
- (4) Equipment Costs, plus
- (5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
- (6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
- (7) Credits for work deleted from the contract.

C. Payment for work on a time and materials basis:

Unless an agreed lump sum and/or unit price is obtained from above and is so stated in the change price, the contractor shall accept as full payment for which no other agreement is contained in contract, and amount equal to:

- (1) The estimated cost of Labor, plus
- (2) Direct Labor Cost, plus
- (3) Material and Freight Costs, plus
- (4) Equipment Costs, plus
- (5) An amount not to exceed 20% of the sum of items (1) through (4) for overhead and profit, plus (if applicable),
- (6) In the case of work done by a subcontractor an amount not to exceed 7 ½ %, for the general contractor of the sum of items (1) through (4) for his overhead and profit, less, if applicable,
- (7) Credits for work deleted from the contract.

Explanation of items (1) through (7) as outlined in “B” and “C”:

- (1) Labor – Only those workers employed on the project who are doing the extra work, including the foreman in charge, are allowable. General foremen, superintendents, or other supervisory personnel are considered to be included in the overhead markup as provided in items (5) and/or (6). Hourly labor rates in excess of those as listed in the contract wage rates (Federal or State, whichever applies) require documentation. As a minimum, an explanation and the appropriate copy of the certified payroll are required.

Policy Memorandum No. PM-10 – Change Orders (Con't)

- (4) Equipment – Only the equipment required as a result of the change order is allowable. Equipment rental rates shall be governed by the current Nielson/Dataquest Rental Rate bluebook for Construction Equipment (the “Bluebook”). In determining the rental rate the following shall apply:
- (a) For equipment already on the project – the monthly prorated rental rate by the hourly use shall be applicable;
 - (b) For equipment not on the project the daily rate, the weekly rate, or monthly rate will prevail, whichever will prove to be most cost effective. Small tools and manual equipment are examples of costs not allowable under this item. These costs are considered to be included in the overhead markup as provided in items (5) and/or (6) (1 month (normal use) = 176 hours)
- (5) & (6) Overhead and Profit – All other costs not previously mentioned are considered to be included in this item, be it for the general contractor or subcontractor(s).
- (7) Credits – Work deleted, material and equipment removed from the contractor, stored and/or returned shall be credited to the cost of the change order, less costs.

The Contractor shall furnish itemized statements of the cost of the work ordered and shall give the Engineer access to all accounts, bills and vouchers relating thereto; and unless the Contractor shall furnish such itemized statements, and access to all accounts, bills and vouchers, he shall not be entitled to payment for any items of extra work for which such information is sought by the Engineer. Deviations from any of the above will be reviewed for financial assistance on a case-by-case basis.

The change order will be prepared in such manner as to clearly separate Eligible and Ineligible Costs.

CHANGE ORDER FORM (Continued)

PM-10 Attachment 1

Page 2 of 2

Public Entity _____

SRF No: _____ Contract No. _____ Change Order No. _____

Contract Title: _____

Owner's Name: _____

Owner's Address: _____

Contractor's Name: _____

Contractor's Address: _____

Description of Change

Reason for Change

CALCULATION SHEET

(1) Labor

Foreman	10 hrs @ \$10.00/hr.	\$	100.00	
Engineer	10 hrs @ 8.50/hr		85.00	
Operator	10 hrs @ 9.50/hr		95.00	
Laborers	24 hrs @ 7.00/hr		<u>168.00</u>	\$448.00

(2) Direct Labor Cost (use the agreed upon Direct Labor Cost)

*	(30)% of \$448			
*	(Used for example purposes only)			134.00

(3) Materials & Freight

150 l.f. of 12" pipe @ \$2.00/l.f.	\$	300.00	
15 v.f. precast SMH		1,700.00	
Freight (slip # _____ Enclosed)		<u>25.00</u>	
			2,025.00

(4) Equipment

1 Backhoe 10 hrs @ \$80.00/hr	\$	800.00	
1 Truck-crane 10 hrs @ \$100.00/hr		<u>1,000.00</u>	
			1,800.00

Total (Items 1 through 4) 4,407.00

(5) 20% markup for Overhead, Profit

20% of \$4,407		881.00
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(6) 7 1/2% markup for general contractor (if subcontractor is involved)

7 1/2% of \$4,407		331.00
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(7) Credits (deductibles)

	<u>- 323.00</u>
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Total Cost \$ 5,296.00

Reminder: Provide support documentation as necessary i.e. vouchers, correspondence, Calculation, photographs, reports

POLICY MEMORANDUM NO. PM-11

UTILITY RELOCATION

The construction of treatment facilities, sewers, pumping stations, force mains and appurtenant work can cause the relocation of utilities. Costly relocation can sometimes be minimized by early communication and cooperation of the representatives of the municipality (owner) and the utilities.

Every possible effort should be made by the owner and each utility to establish the location of existing utilities in the vicinity of the proposed construction. The owner or its consulting engineer should make every reasonable effort to design the proposed construction so that relocation of existing utilities is minimized whenever possible. If the proposed construction is in an area of many existing utilities or in an otherwise critical area, the utilities are encouraged to mark the location of their existing utilities at the site during the design phase of the project.

During the design phase of the project, the municipality should provide timely notice to all utilities known or thought to have facilities in or proximate to the site of such future construction.

POLICY MEMORANDUM NO. PM-12

REFUNDABLE DEPOSITS FOR PLANS AND SPECIFICATIONS

For each set of project plans and specifications provided, the owner may require a deposit in form of cash or other appropriate security, in an amount sufficient to cover the costs of production of such plans and specifications.

Upon return of the plans and specifications to the owner within a reasonable time and in good condition, such deposit shall be refunded.

Actual mailing costs, if any, shall be borne by the party requesting such plans and specifications.

POLICY MEMORANDUM NO. PM-13

BID OPENING PROCEDURES

As a minimum, bid documents shall be reviewed/inspected for conformance to the following bid opening procedure in the order presented below. Failure to comply with any of these steps shall render the bid non-responsive and upon determination of such non-responsiveness, such bid shall be rejected immediately, set aside, and shall receive no further consideration.

Bid Opening Procedure

Step #1. Timeliness – The bid must be filed at the place and within the time specified therefore in the invitation to bid, and no bid shall be accepted after such time. The time at which a bid is filed should be time/date stamped or otherwise prominently noted on the bid;

Policy Memorandum No. PM-13 – Bid Opening Procedures (Con't)

Step #2. Bid Security – Properly executed bid security, in the amount and terms specified in the invitation to bid (equal to 5% of Base Bid or Highest Possible Amount considering all alternatives) shall be placed in a seal envelope and attached to the outside of the envelope containing the bid at the time of its submission;

A. Bid Bond

The Bid bond must be dated On or Before the Bid Date;
Issued by a Bonding Company Licensed in Massachusetts;
Accompanied by a Current Power of Attorney;
Signed by Surety;

B. Check

The Check must be a Certified, Cashiers or Bank Treasurer's;
Dated On or Before the Bid Date;

Step #3. Bid Signature – The bid and all accompanying documents so required shall be signed by the bidder or its authorized representative before submission;

Step #4. Addenda – All addenda shall be sent certified mail, return receipt requested, by the owner to all individuals and organizations which have received plans and specifications and shall be mailed not later than five days prior to the date established for submission of bids. All bidders shall include with their bids written acknowledgement of receipt of all addenda, which acknowledgement may be on a form provided therefore by the owner.

Alternates – Any Alternates shall be acknowledged.

Step #5. Written Dollar Amounts – The total dollar amount of each bid shall be read, and the three lowest bids shall be selected for further consideration. The remaining bids shall then be set aside. The three apparent low bids shall be read to determine whether the unit price for each line item of each bid has been written therein in words. If it has not, such bid shall be rejected and shall receive no further consideration. ***Bid amounts shall be consistent (words vs. numbers) and if words and numbers differ, the words govern.*** This procedure shall then be repeated with the next apparent low bid until three are acceptable which have all the unit prices written in words, at which time the lowest bid shall be announced as the apparent low bidder, and the bid opening procedure shall be closed.

The Division recommends that this policy memorandum be included in all contract specifications and that the owner's evaluator(s) use the attached form (PM-13 Attachment 1) for bid opening procedures.

The Contractor's Bid Opening Checklist also attached hereto, is for use by each contractor to assure that his bid conforms with this policy memorandum. It is recommended that the checklist (PM-13 Attachment 2) be included in information for bidders, or at the end of the bid proposal, or in some other prominent part of the bid specifications

FORM FOR BID OPENING PROCEDURES
(to be completed by the owner's evaluator(s))

CONTRACT NO.: _____

DATE: _____

CONTRACT NAME: _____

BID OPENING TIME: _____

All non-responsive bids shall be rejected forthwith by the awarding authority upon determination of such bids' non-responsiveness at the time bids are opened and read. Failure to comply with any one of the requirements shall render the bid non-responsive, and upon determination of such non-responsiveness such bid shall be rejected and receive no further consideration.

A = Acceptable

N-R = Non-Responsive (explain reasons on supplemental sheet & attach)

BIDDER	1. TIMELINESS	2. BID SECURITY	3. SIGNATURE	4. ADDENDA ALTERNATIVES	5. WRITTEN DOLLAR AMOUNTS	COMPLIANCE (CIRCLE ONE)	
						YES	NO
1						YES	NO
2						YES	NO
3						YES	NO
4						YES	NO
5						YES	NO
6						YES	NO
7						YES	NO
8						YES	NO
9						YES	NO
10						YES	NO
11						YES	NO
12						YES	NO

Evaluator(s) _____

BID OPENING PROCEDURES CONTRACTORS CHECKLIST

CONTRACT NO.: _____ BIDDER: _____ DATE: _____

All non-responsive bids shall be rejected forthwith by the awarding authority upon determination of such bids' non-responsiveness at the time bids are opened and read. Failure to comply with one or more of the following requirements shall render the bid non-responsive, and upon determination of such non-responsiveness such bid shall be rejected and receive no further consideration.

ITEM	REQUIREMENTS	COMPLIANCE (CIRCLE 1)		REASONS FOR REJECTION
		Yes	No; Rejected	
1. Timeliness	Bid filed w/in time specified	Yes	No; Rejected	
2. Bid Security	Appropriate and properly Executed security w/bid.	Yes	No; Rejected	
3. Signature	Bid signed by authorized Representative	Yes	No; Rejected	
4. Addenda	All addenda acknowledge Any alternative	Yes	No; Rejected	
5. Dollar Amount	Dollar amount in words Specified for each line item in bid	Yes	No; Rejected	

POLICY MEMORANDUM NO. PM-14

PAYMENT FOR ROCK EXCAVATION

There shall be in the contract documents a separate pay item for rock excavation. For such purposes, “rock” shall mean igneous, sedimentary, metamorphic, and conglomerate rock, which for excavation must be drilled, blasted, broken, or ripped by power tools. Boulders and concrete structures one cubic yard or greater, however removed, are included within this definition of rock for payment purposes. At the option of the owner or his representative a separate pay item for boulders, concrete structures, or concrete road base may be used.

<u>Depth From Ground Surface</u> <u>To Invert Pipe</u>	<u>Pay Width</u> <u>(Nominal Pipe Diameter)</u>	
* 0 – 12’	<u>0-24”</u>	<u>Over 24”</u>
* Over 12’ – 20’	5’0”	D+3’0”
	7’0”	D+5’

Engineer’s plans and specifications shall establish pay limits below pipe and structures.

- See PM-14 Attachment 1 (typical cross section)

Payment width for depths over twenty feet (20’) shall be determined on a case-by-case basis consistent with the foregoing chart.

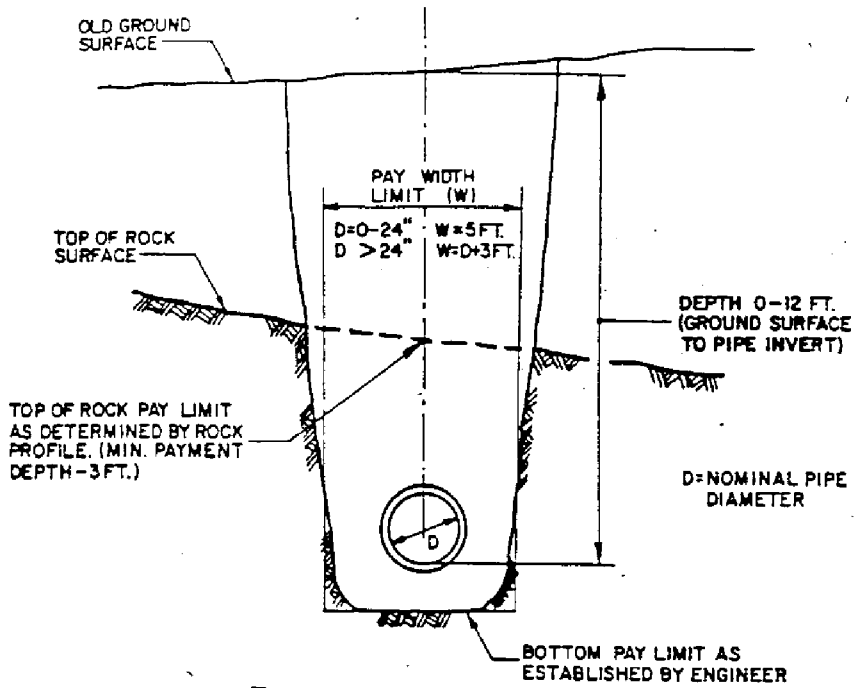
The pay limit for rock removal outside proposed manholes shall commence one foot (1’) outside the widest dimension of the structure of shall be the maximum connecting trench width, whichever is greater.

Payment depth for rock which is encountered in a trench shall be no less than three feet (3’) when removal can be accomplished only by drilling and blasting or by use of jack (air or hydraulic) hammers.

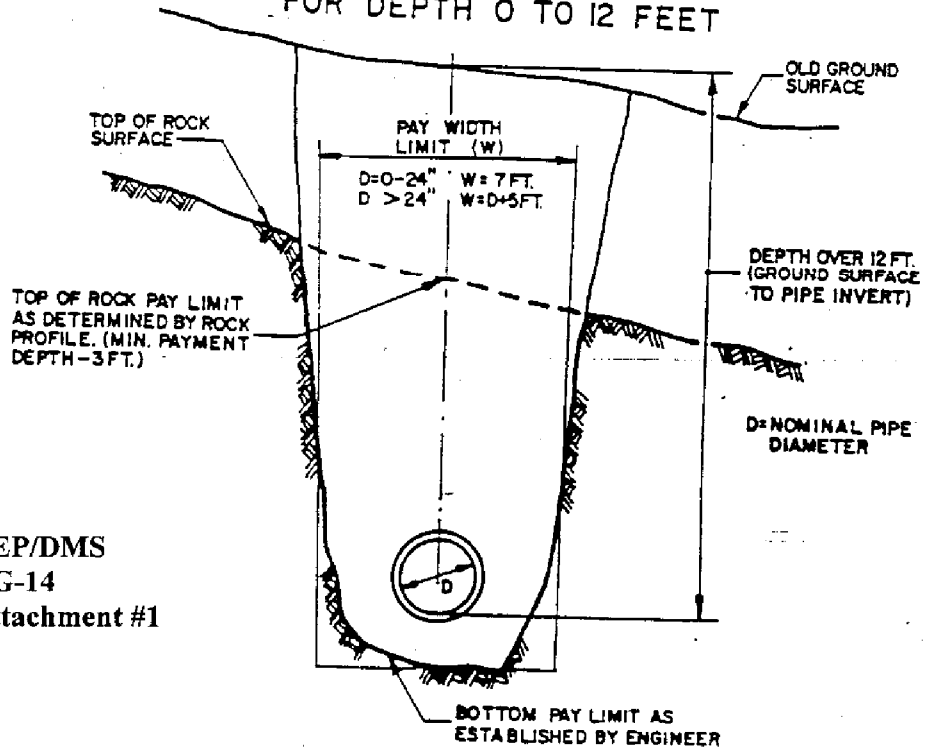
Payment for rock removed, using the same or equal equipment as utilized for normal trench excavation, shall be limited to the actual depth removed within the limits established by the contract documents.

Boulders encountered within the pay limits of excavation, whose volume is one cubic yard or greater, part of which extends outside said limits shall be paid in accordance with the actual volume excavated.

CG-14 ROCK EXCAVATION



FOR DEPTH 0 TO 12 FEET



FOR DEPTH OVER 12 FEET AND UP TO 20 FEET

DEP/DMS
 CG-14
 Attachment #1

POLICY MEMORANDUM NO. PM-15

TRAFFIC POLICE

The reasonable costs for police details required for traffic control on a construction project which receives financial assistance shall be considered as an eligible administrative cost. A police detail item shall not be included as a bid item in the contract documents.

“Police” as used in this memorandum includes local, county, capital, state, regular and auxiliary police.

Owner’s Responsibility

It shall be the owner’s responsibility to submit in writing the hourly rate of pay to be established for detailed traffic police and each change in rate during the course of the project. It is the owner’s responsibility to arrange, document and pay for such police details. The owner or its representative shall meet with the police chief or other officer in charge of police detail duty to review contract needs. The owner shall maintain a daily record of the following:

- a. Officer’s name
- b. Hours worked
- c. Location of assignment
- d. Hourly rate

POLICY MEMORANDUM NO. PM-16

**DOCUMENTATION REQUIRED TO
SUBSTANTIATE CONTRACT QUANTITIES**

Unit

Documentation required

Acres (A)

Location, station, offset and calculations.
Location = Street right-of-way, etc;
Station = Point on Baseline;
Offset = Distance left or right of Baseline

Cubic Yard (C.Y.)

Location, stations, widths, depths, calculations and
Cross sections as necessary

Each (Ea.)

Location, station, and offset.

Gallon (Gal.)

Location, stations, calculations (if appropriate) and delivery slips.

Hour (Hr.)

Hours and location.

Linear Feet (L.F.)

Location, stations, and offsets.

Month (Mo.)

Location, period of time and calculations if applicable.

1000 Foot Board Measure (MFBM)	Location, stations, offset, elevations, grade, and calculations. Attach invoices where applicable.
Pound (Lb.)	Locations, stations, and calculations (if applicable). Attach Delivery weight slips.
Square Feet (S.F.)	Locations, stations and calculations
Square Yard (S.Y.)	Locations, stations and calculations
Ton	Locations, stations and calculations (if applicable). Attach Delivery weight slips.
Vertical Feet (V.F.)	Locations, stations, elevations, and offsets.

Note:

1. All of the above, that apply must be submitted with a final payment request or change order as applicable.
2. Where in place measurement is not possible or practical, delivery slips may be used to substantiate quantities.
3. Change orders – See PM-10 in which some of the above may be applicable in justifying materials, equipment and labor.
4. When necessary, itemized quantities must be separated into eligible and non-eligible units with separate calculations to justify eligible costs.
5. Overruns and underruns of any specific item shall be explained with an appropriate sentence or paragraph.
6. On all quantities, units of payment shall be maintained at the project site and shall be updated daily so that upon field inspection by the C.O.E., EPA or DMS, the quantities paid to date can be substantiated.
7. In the case of unforeseen conditions, photos should be submitted with the applicable item in addition to the recommended documentation.
8. Documentation of units of payment shall be clearly legible and cross referenced to the applicable sheets of the record drawings.
9. For record drawings policy, please see PM-4.

DMS Policies 1 through 16 Approved By:

Steven J. McCurdy
Division of Municipal Services

DWS POLICY 88-02
DEPARTMENT OF ENVIRONMENTAL PROTECTION
POLICY FOR REVIEW OF SEWER LINE/WATER SUPPLY PROTECTION

The Department of Environmental Protection seeks to protect existing and potential water supplies from the potentially negative effects of leaking sewer lines through the adoption of a Department policy on this subject.

The following restrictions will apply to new sewer construction statewide:

Gravel Packed Wells

- ~ Within the 400 foot radius protective distance around gravel packed wells, all sewer lines and appurtenances are prohibited, unless they are necessary to eliminate existing and/or potential sources of pollution to the well.

Tubular Wells

- ~ Within the 250 foot radius protective distance around tubular wells, all sewer lines and appurtenances are prohibited, unless they are necessary to eliminate existing and/or potential sources of pollution to the well.

Gravel Packed and Tubular Wells

- ~ Within a minimum radius of 2,640 feet or unless otherwise documented by an appropriate study specifically defining the area of influence and approved by the Division of Water Supply, all sewer lines and appurtenances will be designed and constructed for maximum water tightness.
- Force Mains or Pressure Sewers: shall be tested at 150% above maximum operating pressure or 150 p.s.i. whichever is greater. Testing shall conform to the requirements of the American Water works Association (AWWA) standard c 600.
- Gravity Sewers: shall be tested by approved methods which will achieve test results for infiltration or exfiltration of less than 100 gallons/inch diameter/mile/24 hours.
- Manholes: shall be installed with watertight covers with locking or bolted and gasketed assemblies. Testing for infiltration/exfiltration shall conform to the same standards as the maximum allowed for pipes in the manhole as required for gravity sewers, indicated above.
- Satisfactory test results for Force Mains, Manholes and Gravity Sewers shall be performed prior to the expiration of the contractor's one year guarantee period.
- All pumping stations within this zone shall have standby power high water alarms telemetered to an appropriated location that is manned at all times. An emergency contingency plan must be developed by the owner and approved by the BWR.
- A minimum of Class B bedding as defined by WPCF-MOP9 must be used for all piping.
- Service connections (laterals and house connections) shall be rigidly inspected by the appropriate municipal official. Certified inspection reports shall be submitted to the BWR.

Bedrock Wells

The above requirements are the same for bedrock wells, with the Department reserving the right to require more stringent controls on a case-by-case basis.

Surface Water Supplies

- ~ Within 100 feet of all surface water supplies and tributaries all sewer lines and appurtenances are prohibited except as required to cross tributaries or to eliminate existing or potential pollution to the water supply. In the latter case, watertight construction methods shall be use.
- ~ Tributary stream crossings shall employ watertight construction methods of sewer lines and manholes. Watertight construction must extend 100 feet to either side of the stream.
- ~ Within 1,000 feet of surface water supplies and tributaries, all pumping stations shall have standby power and high water alarms telemetered to an appropriate location that is manned at all times. An emergency contingency plan must be developed by the owner of the wastewater treatment facility and submitted to the BWR for approval.
- ~ Beyond 1,000 feet and within the watershed of surface water supplies the Department may in specific circumstances after review, require additional controls.

Potential Public Water Supplies

The above requirements also apply to potential public water supplies.

Baseline Date Requirements

Two (2) copies of an appropriately scaled map(s) shall be submitted to the Department which details the proposed sewers and/or appurtenances and also includes the following:

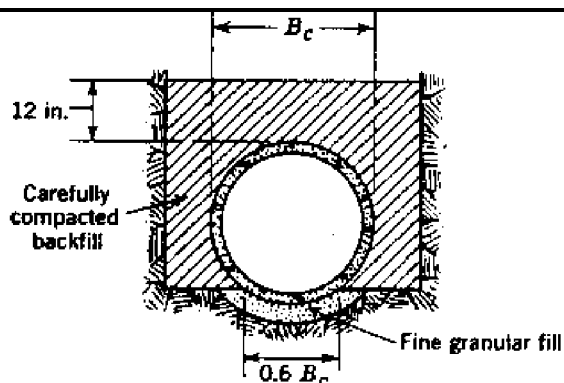
- (1) the location of all nearby existing or potential surface water supplies, tributaries thereto, and watershed boundaries;
- (2) the location of existing and potential public and municipal potable groundwater supply wells.

The Department reserves the right to impose more restrictive measures than those contained in this policy as deemed appropriate.

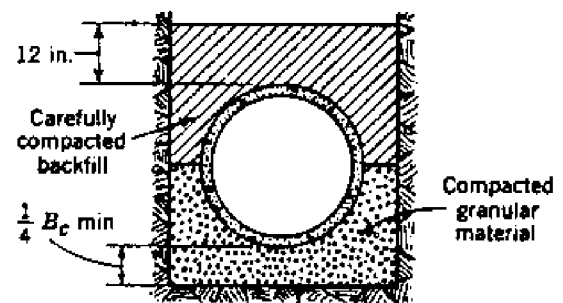
Definitions

- Appurtenances – all attachments to sewer lines necessary for the transport and operation and maintenance of sewer lines, including manholes, pumping station, siphons, etc.
- Area of influence – that area of an aquifer which contributes water to a well under the most severe recharge and pumping condition that can be realistically anticipated (i.e. pumping at the safe yield of the well for 180 days without any natural recharge occurring). It is bounded by the groundwater divides which result from pumping the well and by the contact of the edge of the aquifer with less permeable materials such as till and bedrock. At some locations, streams and lakes may form recharge boundaries.
- Potential public water supply – areas designated by communities for water supply purposes where land has been set aside and Department approved pump tests conducted and surface water supplies as defined below.
- Surface Water Supply – Waters classified as Class A by the DWPC.
- Public Water Supply Systems – as defined in 310 CMR 22.02 (DEP Drinking Water Regulations).
- Class B Bedding – as defined in WPCF Manual of Practice No. 9.

APPROVED: (Signature on File)



Shaped bottom with tamped backfill,
load factor 1.9



Compacted granular bedding,
load factor 1.9

Class B---First-Class Bedding – Class B bedding may be achieved by either of two construction methods:

- a. **Shaped Bottom with Tamped Backfill.** The bottom of the trench excavation shall be shaped to conform to a cylindrical surface with a radius at least 2 in. (5 cm) greater than the radius to the outside of the pipe and with a width sufficient to allow six-tenths of the width of the pipe barrel to be bedded in fine granular fill placed in the shaped excavation. Carefully compacted backfill shall be placed at the sides of the pipe to a thickness of at least 12 in. (30 cm) above the top of the pipe. Shaped trench bottoms are difficult to achieve under current construction conditions.
- b. **Compacted Granular Bedding with Tamped Backfill.** The pipe shall be bedded in compacted granular material placed on a flat trench bottom. The granular bedding shall have a minimum thickness of one-fourth the outside pipe diameter and shall extend halfway up the pipe barrel at the sides. The remainder of the side fills and a minimum depth of 12 in. (30 cm) over the top of the pipe shall be filled with carefully compacted material.

Contract Value _____

The United States Environmental Protection Agency (EPA) requires that all SRF borrowers develop and maintain a list of all MBE/WBE and non MBE/WBE subcontractors on the project.

This form must be completed and returned to MassDEP within 90 days of award of the contract

APPENDIX G

**Massachusetts Prevailing Wage Rates &
Federal Davis-Bacon Wage Rates**

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MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: City of Taunton DPW
Contract Number: S-2023-2 **City/Town:** TAUNTON
Description of Work: Mechanical and electrical improvements at seven wastewater pumping stations.

Job Location: 825 West Water Street, Taunton, MA

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- **The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor.** For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The annual update requirement is not applicable to 27F "rental of equipment" contracts. **The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.**
- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to <http://www.mass.gov/dols/pw>.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$35.95	\$13.41	\$16.01	\$0.00	\$65.37
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.02	\$13.41	\$16.01	\$0.00	\$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.14	\$13.41	\$16.01	\$0.00	\$65.56
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.91	\$9.10	\$16.64	\$0.00	\$63.65
	06/01/2023	\$38.81	\$9.10	\$16.64	\$0.00	\$64.55
	12/01/2023	\$39.71	\$9.10	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$37.31	\$9.35	\$16.89	\$0.00	\$63.55
	06/01/2023	\$38.21	\$9.35	\$16.89	\$0.00	\$64.45
	12/01/2023	\$39.11	\$9.35	\$16.89	\$0.00	\$65.35
	06/01/2024	\$40.44	\$9.35	\$16.89	\$0.00	\$66.68
	12/01/2024	\$41.77	\$9.35	\$16.89	\$0.00	\$68.01
	06/01/2025	\$43.16	\$9.35	\$16.89	\$0.00	\$69.40
	12/01/2025	\$44.54	\$9.35	\$16.89	\$0.00	\$70.78
	06/01/2026	\$45.98	\$9.35	\$16.89	\$0.00	\$72.22
	12/01/2026	\$47.42	\$9.35	\$16.89	\$0.00	\$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS WORKER (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)</i>	12/01/2020	\$38.10	\$12.80	\$9.45	\$0.00	\$60.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$36.81	\$9.35	\$16.89	\$0.00	\$63.05
	06/01/2023	\$37.71	\$9.35	\$16.89	\$0.00	\$63.95
	12/01/2023	\$38.61	\$9.35	\$16.89	\$0.00	\$64.85
	06/01/2024	\$39.94	\$9.35	\$16.89	\$0.00	\$66.18
	12/01/2024	\$41.27	\$9.35	\$16.89	\$0.00	\$67.51
	06/01/2025	\$42.66	\$9.35	\$16.89	\$0.00	\$68.90
	12/01/2025	\$44.04	\$9.35	\$16.89	\$0.00	\$70.28
	06/01/2026	\$45.48	\$9.35	\$16.89	\$0.00	\$71.72
	12/01/2026	\$46.92	\$9.35	\$16.89	\$0.00	\$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.91	\$9.10	\$16.64	\$0.00	\$63.65
	06/01/2023	\$38.81	\$9.10	\$16.64	\$0.00	\$64.55
	12/01/2023	\$39.71	\$9.10	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$37.31	\$9.35	\$16.89	\$0.00	\$63.55
	06/01/2023	\$38.21	\$9.35	\$16.89	\$0.00	\$64.45
	12/01/2023	\$39.11	\$9.35	\$16.89	\$0.00	\$65.35
	06/01/2024	\$40.44	\$9.35	\$16.89	\$0.00	\$66.68
	12/01/2024	\$41.77	\$9.35	\$16.89	\$0.00	\$68.01
	06/01/2025	\$43.16	\$9.35	\$16.89	\$0.00	\$69.40
	12/01/2025	\$44.54	\$9.35	\$16.89	\$0.00	\$70.78
	06/01/2026	\$45.98	\$9.35	\$16.89	\$0.00	\$72.22
	12/01/2026	\$47.42	\$9.35	\$16.89	\$0.00	\$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2023	\$47.37	\$7.07	\$20.31	\$0.00	\$74.75
	01/01/2024	\$48.12	\$7.07	\$20.60	\$0.00	\$75.79

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$30.79	\$7.07	\$13.22	\$0.00	\$51.08
2	65	\$30.79	\$7.07	\$13.22	\$0.00	\$51.08
3	70	\$33.16	\$7.07	\$14.23	\$0.00	\$54.46
4	75	\$35.53	\$7.07	\$15.24	\$0.00	\$57.84
5	80	\$37.90	\$7.07	\$16.25	\$0.00	\$61.22
6	85	\$40.26	\$7.07	\$17.28	\$0.00	\$64.61
7	90	\$42.63	\$7.07	\$18.28	\$0.00	\$67.98
8	95	\$45.00	\$7.07	\$19.32	\$0.00	\$71.39

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
2	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
3	70	\$33.68	\$7.07	\$14.23	\$0.00	\$54.98
4	75	\$36.09	\$7.07	\$15.24	\$0.00	\$58.40
5	80	\$38.50	\$7.07	\$16.25	\$0.00	\$61.82
6	85	\$40.90	\$7.07	\$17.28	\$0.00	\$65.25
7	90	\$43.31	\$7.07	\$18.28	\$0.00	\$68.66
8	95	\$45.71	\$7.07	\$19.32	\$0.00	\$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	02/01/2023	\$58.21	\$11.49	\$21.65	\$0.00	\$91.35
BRICKLAYERS LOCAL 3 (FOXBORO)	08/01/2023	\$60.26	\$11.49	\$21.65	\$0.00	\$93.40
	02/01/2024	\$61.51	\$11.49	\$21.65	\$0.00	\$94.65
	08/01/2024	\$63.61	\$11.49	\$21.65	\$0.00	\$96.75
	02/01/2025	\$64.91	\$11.49	\$21.65	\$0.00	\$98.05
	08/01/2025	\$67.06	\$11.49	\$21.65	\$0.00	\$100.20
	02/01/2026	\$68.41	\$11.49	\$21.65	\$0.00	\$101.55
	08/01/2026	\$70.61	\$11.49	\$21.65	\$0.00	\$103.75
	02/01/2027	\$72.01	\$11.49	\$21.65	\$0.00	\$105.15

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Foxboro

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.11	\$11.49	\$21.65	\$0.00	\$62.25
2	60	\$34.93	\$11.49	\$21.65	\$0.00	\$68.07
3	70	\$40.75	\$11.49	\$21.65	\$0.00	\$73.89
4	80	\$46.57	\$11.49	\$21.65	\$0.00	\$79.71
5	90	\$52.39	\$11.49	\$21.65	\$0.00	\$85.53

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.13	\$11.49	\$21.65	\$0.00	\$63.27
2	60	\$36.16	\$11.49	\$21.65	\$0.00	\$69.30
3	70	\$42.18	\$11.49	\$21.65	\$0.00	\$75.32
4	80	\$48.21	\$11.49	\$21.65	\$0.00	\$81.35
5	90	\$54.23	\$11.49	\$21.65	\$0.00	\$87.37

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
<i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN	12/01/2022	\$43.73	\$9.35	\$17.97	\$0.00	\$71.05
<i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2023	\$44.73	\$9.35	\$17.97	\$0.00	\$72.05
	12/01/2023	\$45.98	\$9.35	\$17.97	\$0.00	\$73.30
	06/01/2024	\$47.46	\$9.35	\$17.97	\$0.00	\$74.78
	12/01/2024	\$48.93	\$9.35	\$17.97	\$0.00	\$76.25
	06/01/2025	\$50.43	\$9.35	\$17.97	\$0.00	\$77.75
	12/01/2025	\$51.93	\$9.35	\$17.97	\$0.00	\$79.25
	06/01/2026	\$53.48	\$9.35	\$17.97	\$0.00	\$80.80
	12/01/2026	\$54.98	\$9.35	\$17.97	\$0.00	\$82.30

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	03/01/2023	\$45.78	\$8.68	\$19.97	\$0.00	\$74.43

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.89	\$8.68	\$1.73	\$0.00	\$33.30
2	60	\$27.47	\$8.68	\$1.73	\$0.00	\$37.88
3	70	\$32.05	\$8.68	\$14.78	\$0.00	\$55.51
4	75	\$34.34	\$8.68	\$14.78	\$0.00	\$57.80
5	80	\$36.62	\$8.68	\$16.51	\$0.00	\$61.81
6	80	\$36.62	\$8.68	\$16.51	\$0.00	\$61.81
7	90	\$41.20	\$8.68	\$18.24	\$0.00	\$68.12
8	90	\$41.20	\$8.68	\$18.24	\$0.00	\$68.12

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 \$30.71/ 3&4 \$36.93/ 5&6 \$56.82/ 7&8 \$63.06

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME <i>CARPENTERS-ZONE 3 (Wood Frame)</i>	04/01/2022	\$23.66	\$7.21	\$4.80	\$0.00	\$35.67
	04/01/2023	\$24.16	\$7.21	\$4.80	\$0.00	\$36.17

All Aspects of New Wood Frame Work

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER (Wood Frame) - Zone 3

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$14.20	\$7.21	\$0.00	\$0.00	\$21.41
2	60	\$14.20	\$7.21	\$0.00	\$0.00	\$21.41
3	65	\$15.38	\$7.21	\$0.00	\$0.00	\$22.59
4	70	\$16.56	\$7.21	\$0.00	\$0.00	\$23.77
5	75	\$17.75	\$7.21	\$3.80	\$0.00	\$28.76
6	80	\$18.93	\$7.21	\$3.80	\$0.00	\$29.94
7	85	\$20.11	\$7.21	\$3.80	\$0.00	\$31.12
8	90	\$21.29	\$7.21	\$3.80	\$0.00	\$32.30

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$14.50	\$7.21	\$0.00	\$0.00	\$21.71
2	60	\$14.50	\$7.21	\$0.00	\$0.00	\$21.71
3	65	\$15.70	\$7.21	\$0.00	\$0.00	\$22.91
4	70	\$16.91	\$7.21	\$0.00	\$0.00	\$24.12
5	75	\$18.12	\$7.21	\$3.80	\$0.00	\$29.13
6	80	\$19.33	\$7.21	\$3.80	\$0.00	\$30.34
7	85	\$20.54	\$7.21	\$3.80	\$0.00	\$31.55
8	90	\$21.74	\$7.21	\$3.80	\$0.00	\$32.75

Notes:
 % Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$17.86/ 3&4 \$20.22/ 5&6 \$27.57/ 7&8 \$29.94

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING	01/01/2023	\$49.45	\$12.75	\$22.74	\$0.87	\$85.81
BRICKLAYERS LOCAL 3 (FOXBORO)	07/01/2023	\$50.59	\$12.75	\$22.74	\$0.87	\$86.95
	01/01/2024	\$51.73	\$12.75	\$22.74	\$0.87	\$88.09

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CEMENT MASONRY/PLASTERING - Foxboro

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.73	\$12.75	\$15.49	\$0.00	\$52.97
2	60	\$29.67	\$12.75	\$22.74	\$0.87	\$66.03
3	65	\$32.14	\$12.75	\$22.74	\$0.87	\$68.50
4	70	\$34.62	\$12.75	\$22.74	\$0.87	\$70.98
5	75	\$37.09	\$12.75	\$22.74	\$0.87	\$73.45
6	80	\$39.56	\$12.75	\$22.74	\$0.87	\$75.92
7	90	\$44.51	\$12.75	\$22.74	\$0.87	\$80.87

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.30	\$12.75	\$15.49	\$0.00	\$53.54
2	60	\$30.35	\$12.75	\$22.74	\$0.87	\$66.71
3	65	\$32.88	\$12.75	\$22.74	\$0.87	\$69.24
4	70	\$35.41	\$12.75	\$22.74	\$0.87	\$71.77
5	75	\$37.94	\$12.75	\$22.74	\$0.87	\$74.30
6	80	\$40.47	\$12.75	\$22.74	\$0.87	\$76.83
7	90	\$45.53	\$12.75	\$22.74	\$0.87	\$81.89

Notes:
Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR LABORERS - ZONE 2	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES OPERATING ENGINEERS LOCAL 4	12/01/2022	\$54.68	\$14.25	\$16.05	\$0.00	\$84.98
	06/01/2023	\$55.95	\$14.25	\$16.05	\$0.00	\$86.25
	12/01/2023	\$57.23	\$14.25	\$16.05	\$0.00	\$87.53
	06/01/2024	\$58.55	\$14.25	\$16.05	\$0.00	\$88.85
	12/01/2024	\$60.03	\$14.25	\$16.05	\$0.00	\$90.33
	06/01/2025	\$61.36	\$14.25	\$16.05	\$0.00	\$91.66
	12/01/2025	\$62.83	\$14.25	\$16.05	\$0.00	\$93.13
	06/01/2026	\$64.16	\$14.25	\$16.05	\$0.00	\$94.46
	12/01/2026	\$65.64	\$14.25	\$16.05	\$0.00	\$95.94

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN <i>LABORERS - ZONE 2</i>	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS <i>LABORERS - ZONE 2</i>	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 2</i>	12/01/2022	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.33	\$9.10	\$17.57	\$0.00	\$72.00
	12/01/2023	\$46.58	\$9.10	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$44.08	\$9.10	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.08	\$9.10	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.33	\$9.10	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	12/01/2022	\$43.33	\$9.10	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.33	\$9.10	\$17.57	\$0.00	\$71.00
	12/01/2023	\$45.58	\$9.10	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 223</i>	09/01/2022	\$46.35	\$11.50	\$16.18	\$0.00	\$74.03
	09/01/2023	\$47.87	\$11.75	\$16.86	\$0.00	\$76.48

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELECTRICIAN - Local 223

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.54	\$11.50	\$0.56	\$0.00	\$30.60
2	45	\$20.86	\$11.50	\$0.63	\$0.00	\$32.99
3	50	\$23.18	\$11.50	\$0.70	\$0.00	\$35.38
4	55	\$25.49	\$11.50	\$7.35	\$0.00	\$44.34
5	60	\$27.81	\$11.50	\$7.86	\$0.00	\$47.17
6	65	\$30.13	\$11.50	\$8.37	\$0.00	\$50.00
7	70	\$32.45	\$11.50	\$8.89	\$0.00	\$52.84
8	75	\$34.76	\$11.50	\$9.40	\$0.00	\$55.66

Effective Date - 09/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.15	\$11.75	\$0.57	\$0.00	\$31.47
2	45	\$21.54	\$11.75	\$0.65	\$0.00	\$33.94
3	50	\$23.94	\$11.75	\$0.72	\$0.00	\$36.41
4	55	\$26.33	\$11.75	\$7.79	\$0.00	\$45.87
5	60	\$28.72	\$11.75	\$8.31	\$0.00	\$48.78
6	65	\$31.12	\$11.75	\$8.65	\$0.00	\$51.52
7	70	\$33.51	\$11.75	\$9.38	\$0.00	\$54.64
8	75	\$35.90	\$11.75	\$9.90	\$0.00	\$57.55

Notes:

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR ELEVATOR CONSTRUCTORS LOCAL 4	01/01/2022	\$65.62	\$16.03	\$20.21	\$0.00	\$101.86
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Apprentice - ELEVATOR CONSTRUCTOR - Local 4

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.81	\$16.03	\$0.00	\$0.00	\$48.84
2	55	\$36.09	\$16.03	\$20.21	\$0.00	\$72.33
3	65	\$42.65	\$16.03	\$20.21	\$0.00	\$78.89
4	70	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
5	80	\$52.50	\$16.03	\$20.21	\$0.00	\$88.74

Notes:
Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER ELEVATOR CONSTRUCTORS LOCAL 4	01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$36.81	\$9.35	\$16.89	\$0.00	\$63.05
	06/01/2023	\$37.71	\$9.35	\$16.89	\$0.00	\$63.95
	12/01/2023	\$38.61	\$9.35	\$16.89	\$0.00	\$64.85
	06/01/2024	\$39.94	\$9.35	\$16.89	\$0.00	\$66.18
	12/01/2024	\$41.27	\$9.35	\$16.89	\$0.00	\$67.51
	06/01/2025	\$42.66	\$9.35	\$16.89	\$0.00	\$68.90
	12/01/2025	\$44.04	\$9.35	\$16.89	\$0.00	\$70.28
	06/01/2026	\$45.48	\$9.35	\$16.89	\$0.00	\$71.72
	12/01/2026	\$46.92	\$9.35	\$16.89	\$0.00	\$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/05/2022	\$48.67	\$14.25	\$16.05	\$0.00	\$78.97
	05/01/2023	\$49.91	\$14.25	\$16.05	\$0.00	\$80.21
	11/01/2023	\$51.15	\$14.25	\$16.05	\$0.00	\$81.45
	05/01/2024	\$52.39	\$14.25	\$16.05	\$0.00	\$82.69
	11/01/2024	\$53.68	\$14.25	\$16.05	\$0.00	\$83.98
	05/01/2025	\$55.12	\$14.25	\$16.05	\$0.00	\$85.42
	11/01/2025	\$56.41	\$14.25	\$16.05	\$0.00	\$86.71
	05/01/2026	\$57.85	\$14.25	\$16.05	\$0.00	\$88.15
	11/01/2026	\$59.14	\$14.25	\$16.05	\$0.00	\$89.44
	05/01/2027	\$60.57	\$14.25	\$16.05	\$0.00	\$90.87
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$50.22	\$14.25	\$16.05	\$0.00	\$80.52
	05/01/2023	\$51.47	\$14.25	\$16.05	\$0.00	\$81.77
	11/01/2023	\$52.72	\$14.25	\$16.05	\$0.00	\$83.02
	05/01/2024	\$53.97	\$14.25	\$16.05	\$0.00	\$84.27
	11/01/2024	\$55.27	\$14.25	\$16.05	\$0.00	\$85.57
	05/01/2025	\$56.72	\$14.25	\$16.05	\$0.00	\$87.02
	11/01/2025	\$58.02	\$14.25	\$16.05	\$0.00	\$88.32
	05/01/2026	\$59.47	\$14.25	\$16.05	\$0.00	\$89.77
	11/01/2026	\$60.77	\$14.25	\$16.05	\$0.00	\$91.07
	05/01/2027	\$62.22	\$14.25	\$16.05	\$0.00	\$92.52
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2022	\$24.31	\$14.25	\$16.05	\$0.00	\$54.61
	05/01/2023	\$25.05	\$14.25	\$16.05	\$0.00	\$55.35
	11/01/2023	\$25.78	\$14.25	\$16.05	\$0.00	\$56.08
	05/01/2024	\$26.51	\$14.25	\$16.05	\$0.00	\$56.81
	11/01/2024	\$27.27	\$14.25	\$16.05	\$0.00	\$57.57
	05/01/2025	\$28.12	\$14.25	\$16.05	\$0.00	\$58.42
	11/01/2025	\$28.88	\$14.25	\$16.05	\$0.00	\$59.18
	05/01/2026	\$29.73	\$14.25	\$16.05	\$0.00	\$60.03
	11/01/2026	\$30.49	\$14.25	\$16.05	\$0.00	\$60.79
	05/01/2027	\$31.34	\$14.25	\$16.05	\$0.00	\$61.64
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 223</i>	09/01/2020	\$43.66	\$10.90	\$14.66	\$0.00	\$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING <i>ELECTRICIANS</i>	09/01/2020	\$36.86	\$10.90	\$12.45	\$0.00	\$60.21
<i>LOCAL 223</i> For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$43.54	\$14.25	\$16.05	\$0.00	\$73.84
	06/01/2023	\$44.56	\$14.25	\$16.05	\$0.00	\$74.86
	12/01/2023	\$45.57	\$14.25	\$16.05	\$0.00	\$75.87
	06/01/2024	\$46.63	\$14.25	\$16.05	\$0.00	\$76.93
	12/01/2024	\$47.81	\$14.25	\$16.05	\$0.00	\$78.11
	06/01/2025	\$48.87	\$14.25	\$16.05	\$0.00	\$79.17
	12/01/2025	\$50.04	\$14.25	\$16.05	\$0.00	\$80.34
	06/01/2026	\$51.10	\$14.25	\$16.05	\$0.00	\$81.40
	12/01/2026	\$52.28	\$14.25	\$16.05	\$0.00	\$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$25.23	\$9.35	\$16.89	\$0.00	\$51.47
	06/01/2023	\$25.98	\$9.35	\$16.89	\$0.00	\$52.22
	12/01/2023	\$25.98	\$9.35	\$16.89	\$0.00	\$52.22
	06/01/2024	\$27.01	\$9.35	\$16.89	\$0.00	\$53.25
	12/01/2024	\$27.01	\$9.35	\$16.89	\$0.00	\$53.25
	06/01/2025	\$28.09	\$9.35	\$16.89	\$0.00	\$54.33
	12/01/2025	\$28.09	\$9.35	\$16.89	\$0.00	\$54.33
	06/01/2026	\$29.21	\$9.35	\$16.89	\$0.00	\$55.45
	12/01/2026	\$29.21	\$9.35	\$16.89	\$0.00	\$55.45
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE 1</i>	03/01/2022	\$49.93	\$8.68	\$20.27	\$0.00	\$78.88

Apprentice - FLOORCOVERER - Local 2168 Zone 1

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.97	\$8.68	\$1.79	\$0.00	\$35.44
2	55	\$27.46	\$8.68	\$1.79	\$0.00	\$37.93
3	60	\$29.96	\$8.68	\$14.90	\$0.00	\$53.54
4	65	\$32.45	\$8.68	\$14.90	\$0.00	\$56.03
5	70	\$34.95	\$8.68	\$16.69	\$0.00	\$60.32
6	75	\$37.45	\$8.68	\$16.69	\$0.00	\$62.82
7	80	\$39.94	\$8.68	\$18.48	\$0.00	\$67.10
8	85	\$42.44	\$8.68	\$18.48	\$0.00	\$69.60

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 \$32.94/ 3&4 \$39.66/ 5&6 \$60.32/ 7&8 \$67.10

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 1333</i>	06/01/2020	\$39.18	\$10.80	\$10.45	\$0.00	\$60.43

Apprentice - GLAZIER - Local 1333

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.59	\$10.80	\$1.80	\$0.00	\$32.19
2	56	\$22.04	\$10.80	\$1.80	\$0.00	\$34.64
3	63	\$24.49	\$10.80	\$2.45	\$0.00	\$37.74
4	69	\$26.94	\$10.80	\$2.45	\$0.00	\$40.19
5	75	\$29.39	\$10.80	\$3.15	\$0.00	\$43.34
6	81	\$31.83	\$10.80	\$3.15	\$0.00	\$45.78
7	88	\$34.28	\$10.80	\$10.45	\$0.00	\$55.53
8	94	\$36.73	\$10.80	\$10.45	\$0.00	\$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HOISTING ENGINEER/CRANES/GRADALLS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$29.50	\$14.25	\$0.00	\$0.00	\$43.75
2	60	\$32.18	\$14.25	\$16.05	\$0.00	\$62.48
3	65	\$34.86	\$14.25	\$16.05	\$0.00	\$65.16
4	70	\$37.54	\$14.25	\$16.05	\$0.00	\$67.84
5	75	\$40.22	\$14.25	\$16.05	\$0.00	\$70.52
6	80	\$42.90	\$14.25	\$16.05	\$0.00	\$73.20
7	85	\$45.59	\$14.25	\$16.05	\$0.00	\$75.89
8	90	\$48.27	\$14.25	\$16.05	\$0.00	\$78.57

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$30.18	\$14.25	\$0.00	\$0.00	\$44.43
2	60	\$32.93	\$14.25	\$16.05	\$0.00	\$63.23
3	65	\$35.67	\$14.25	\$16.05	\$0.00	\$65.97
4	70	\$38.42	\$14.25	\$16.05	\$0.00	\$68.72
5	75	\$41.16	\$14.25	\$16.05	\$0.00	\$71.46
6	80	\$43.90	\$14.25	\$16.05	\$0.00	\$74.20
7	85	\$46.65	\$14.25	\$16.05	\$0.00	\$76.95
8	90	\$49.39	\$14.25	\$16.05	\$0.00	\$79.69

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

For apprentice rates see "Apprentice- SHEET METAL WORKER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (ELECTRICAL CONTROLS) <i>ELECTRICIANS LOCAL 223</i>	09/01/2020	\$43.66	\$10.90	\$14.66	\$0.00	\$69.22
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING - WATER) <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.91	\$9.10	\$16.64	\$0.00	\$63.65
	06/01/2023	\$38.81	\$9.10	\$16.64	\$0.00	\$64.55
	12/01/2023	\$39.71	\$9.10	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$37.31	\$9.35	\$16.89	\$0.00	\$63.55
	06/01/2023	\$38.21	\$9.35	\$16.89	\$0.00	\$64.45
	12/01/2023	\$39.11	\$9.35	\$16.89	\$0.00	\$65.35
	06/01/2024	\$40.44	\$9.35	\$16.89	\$0.00	\$66.68
	12/01/2024	\$41.77	\$9.35	\$16.89	\$0.00	\$68.01
	06/01/2025	\$43.16	\$9.35	\$16.89	\$0.00	\$69.40
	12/01/2025	\$44.54	\$9.35	\$16.89	\$0.00	\$70.78
	06/01/2026	\$45.98	\$9.35	\$16.89	\$0.00	\$72.22
	12/01/2026	\$47.42	\$9.35	\$16.89	\$0.00	\$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (SOUTHERN MASS)</i>	09/01/2022	\$48.95	\$13.80	\$17.14	\$0.00	\$79.89

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Southern MA

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.48	\$13.80	\$12.42	\$0.00	\$50.70
2	60	\$29.37	\$13.80	\$13.36	\$0.00	\$56.53
3	70	\$34.27	\$13.80	\$14.31	\$0.00	\$62.38
4	80	\$39.16	\$13.80	\$15.25	\$0.00	\$68.21

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER <i>IRONWORKERS LOCAL 37</i>	03/16/2021	\$42.46	\$7.70	\$17.10	\$0.00	\$67.26
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Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - IRONWORKER - Local 37

Effective Date - 03/16/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	70	\$29.72	\$7.70	\$17.10	\$0.00	\$54.52
2	75	\$31.85	\$7.70	\$17.10	\$0.00	\$56.65
3	80	\$33.97	\$7.70	\$17.10	\$0.00	\$58.77
4	85	\$36.09	\$7.70	\$17.10	\$0.00	\$60.89
5	90	\$38.21	\$7.70	\$17.10	\$0.00	\$63.01
6	95	\$40.34	\$7.70	\$17.10	\$0.00	\$65.14

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 2	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

LABORER LABORERS - ZONE 2	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70

Apprentice - LABORER - Zone 2

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$22.30	\$9.10	\$16.64	\$0.00	\$48.04
2	70	\$26.01	\$9.10	\$16.64	\$0.00	\$51.75
3	80	\$29.73	\$9.10	\$16.64	\$0.00	\$55.47
4	90	\$33.44	\$9.10	\$16.64	\$0.00	\$59.18

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$22.84	\$9.10	\$16.64	\$0.00	\$48.58
2	70	\$26.64	\$9.10	\$16.64	\$0.00	\$52.38
3	80	\$30.45	\$9.10	\$16.64	\$0.00	\$56.19
4	90	\$34.25	\$9.10	\$16.64	\$0.00	\$59.99

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2022	\$36.56	\$9.35	\$16.89	\$0.00	\$62.80
	06/01/2023	\$37.46	\$9.35	\$16.89	\$0.00	\$63.70
	12/01/2023	\$38.36	\$9.35	\$16.89	\$0.00	\$64.60
	06/01/2024	\$39.69	\$9.35	\$16.89	\$0.00	\$65.93
	12/01/2024	\$41.02	\$9.35	\$16.89	\$0.00	\$67.26
	06/01/2025	\$42.41	\$9.35	\$16.89	\$0.00	\$68.65
	12/01/2025	\$43.79	\$9.35	\$16.89	\$0.00	\$70.03
	06/01/2026	\$45.23	\$9.35	\$16.89	\$0.00	\$71.47
	12/01/2026	\$46.67	\$9.35	\$16.89	\$0.00	\$72.91

Apprentice - LABORER (Heavy & Highway) - Zone 2

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$21.94	\$9.35	\$16.89	\$0.00	\$48.18
2	70	\$25.59	\$9.35	\$16.89	\$0.00	\$51.83
3	80	\$29.25	\$9.35	\$16.89	\$0.00	\$55.49
4	90	\$32.90	\$9.35	\$16.89	\$0.00	\$59.14

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$22.48	\$9.35	\$16.89	\$0.00	\$48.72
2	70	\$26.22	\$9.35	\$16.89	\$0.00	\$52.46
3	80	\$29.97	\$9.35	\$16.89	\$0.00	\$56.21
4	90	\$33.71	\$9.35	\$16.89	\$0.00	\$59.95

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER LABORERS - ZONE 2	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70

For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER LABORERS - ZONE 2	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70

For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER LABORERS - ZONE 2	12/01/2022	\$37.25	\$9.10	\$16.70	\$0.00	\$63.05
	06/01/2023	\$38.15	\$9.10	\$16.70	\$0.00	\$63.95
	12/01/2023	\$39.05	\$9.10	\$16.70	\$0.00	\$64.85

For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER LABORERS - ZONE 2	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$36.81	\$9.35	\$16.89	\$0.00	\$63.05
	06/01/2023	\$37.71	\$9.35	\$16.89	\$0.00	\$63.95
	12/01/2023	\$38.61	\$9.35	\$16.89	\$0.00	\$64.85
	06/01/2024	\$39.94	\$9.35	\$16.89	\$0.00	\$66.18
	12/01/2024	\$41.27	\$9.35	\$16.89	\$0.00	\$67.51
	06/01/2025	\$42.66	\$9.35	\$16.89	\$0.00	\$68.90
	12/01/2025	\$44.04	\$9.35	\$16.89	\$0.00	\$70.28
	06/01/2026	\$45.48	\$9.35	\$16.89	\$0.00	\$71.72
	12/01/2026	\$46.92	\$9.35	\$16.89	\$0.00	\$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.16	\$9.10	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.06	\$9.10	\$16.64	\$0.00	\$63.80
	12/01/2023	\$38.96	\$9.10	\$16.64	\$0.00	\$64.70
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$36.81	\$9.35	\$16.89	\$0.00	\$63.05
	06/01/2023	\$37.71	\$9.35	\$16.89	\$0.00	\$63.95
	12/01/2023	\$38.61	\$9.35	\$16.89	\$0.00	\$64.85
	06/01/2024	\$39.94	\$9.35	\$16.89	\$0.00	\$66.18
	12/01/2024	\$41.27	\$9.35	\$16.89	\$0.00	\$67.51
	06/01/2025	\$42.66	\$9.35	\$16.89	\$0.00	\$68.90
	12/01/2025	\$44.04	\$9.35	\$16.89	\$0.00	\$70.28
	06/01/2026	\$45.48	\$9.35	\$16.89	\$0.00	\$71.72
	12/01/2026	\$46.92	\$9.35	\$16.89	\$0.00	\$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2023	\$46.25	\$11.49	\$20.37	\$0.00	\$78.11
	08/01/2023	\$47.89	\$11.49	\$20.37	\$0.00	\$79.75
	02/01/2024	\$48.89	\$11.49	\$20.37	\$0.00	\$80.75
	08/01/2024	\$50.57	\$11.49	\$20.37	\$0.00	\$82.43
	02/01/2025	\$51.61	\$11.49	\$20.37	\$0.00	\$83.47
	08/01/2025	\$53.33	\$11.49	\$20.37	\$0.00	\$85.19
	02/01/2026	\$54.41	\$11.49	\$20.37	\$0.00	\$86.27
	08/01/2026	\$56.17	\$11.49	\$20.37	\$0.00	\$88.03
	02/01/2027	\$57.29	\$11.49	\$20.37	\$0.00	\$89.15

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.13	\$11.49	\$20.37	\$0.00	\$54.99
2	60	\$27.75	\$11.49	\$20.37	\$0.00	\$59.61
3	70	\$32.38	\$11.49	\$20.37	\$0.00	\$64.24
4	80	\$37.00	\$11.49	\$20.37	\$0.00	\$68.86
5	90	\$41.63	\$11.49	\$20.37	\$0.00	\$73.49

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.95	\$11.49	\$20.37	\$0.00	\$55.81
2	60	\$28.73	\$11.49	\$20.37	\$0.00	\$60.59
3	70	\$33.52	\$11.49	\$20.37	\$0.00	\$65.38
4	80	\$38.31	\$11.49	\$20.37	\$0.00	\$70.17
5	90	\$43.10	\$11.49	\$20.37	\$0.00	\$74.96

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH	02/01/2023	\$60.37	\$11.49	\$22.31	\$0.00	\$94.17
BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2023	\$62.42	\$11.49	\$22.31	\$0.00	\$96.22
	02/01/2024	\$63.67	\$11.49	\$22.31	\$0.00	\$97.47
	08/01/2024	\$65.77	\$11.49	\$22.31	\$0.00	\$99.57
	02/01/2025	\$67.07	\$11.49	\$22.31	\$0.00	\$100.87
	08/01/2025	\$69.22	\$11.49	\$22.31	\$0.00	\$103.02
	02/01/2026	\$70.57	\$11.49	\$22.31	\$0.00	\$104.37
	08/01/2026	\$72.77	\$11.49	\$22.31	\$0.00	\$106.57
	02/01/2027	\$74.17	\$11.49	\$22.31	\$0.00	\$107.97

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.19	\$11.49	\$22.31	\$0.00	\$63.99
2	60	\$36.22	\$11.49	\$22.31	\$0.00	\$70.02
3	70	\$42.26	\$11.49	\$22.31	\$0.00	\$76.06
4	80	\$48.30	\$11.49	\$22.31	\$0.00	\$82.10
5	90	\$54.33	\$11.49	\$22.31	\$0.00	\$88.13

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.21	\$11.49	\$22.31	\$0.00	\$65.01
2	60	\$37.45	\$11.49	\$22.31	\$0.00	\$71.25
3	70	\$43.69	\$11.49	\$22.31	\$0.00	\$77.49
4	80	\$49.94	\$11.49	\$22.31	\$0.00	\$83.74
5	90	\$56.18	\$11.49	\$22.31	\$0.00	\$89.98

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2) <i>MILLWRIGHTS LOCAL 1121 - Zone 2</i>	01/02/2023	\$41.92	\$8.58	\$21.57	\$0.00	\$72.07
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Apprentice - MILLWRIGHT - Local 1121 Zone 2

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$23.06	\$8.58	\$5.72	\$0.00	\$37.36
2	65	\$27.25	\$8.58	\$17.93	\$0.00	\$53.76
3	75	\$31.44	\$8.58	\$18.98	\$0.00	\$59.00
4	85	\$35.63	\$8.58	\$20.01	\$0.00	\$64.22

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 \$5.72, Step 2 \$6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES,GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$24.37	\$14.25	\$16.05	\$0.00	\$54.67
	06/01/2023	\$24.94	\$14.25	\$16.05	\$0.00	\$55.24
	12/01/2023	\$25.51	\$14.25	\$16.05	\$0.00	\$55.81
	06/01/2024	\$26.11	\$14.25	\$16.05	\$0.00	\$56.41
	12/01/2024	\$26.77	\$14.25	\$16.05	\$0.00	\$57.07
	06/01/2025	\$27.37	\$14.25	\$16.05	\$0.00	\$57.67
	12/01/2025	\$28.03	\$14.25	\$16.05	\$0.00	\$58.33
	06/01/2026	\$28.62	\$14.25	\$16.05	\$0.00	\$58.92
	12/01/2026	\$29.29	\$14.25	\$16.05	\$0.00	\$59.59

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OILER (TRUCK CRANES, GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$29.57	\$14.25	\$16.05	\$0.00	\$59.87
	06/01/2023	\$30.27	\$14.25	\$16.05	\$0.00	\$60.57
	12/01/2023	\$30.96	\$14.25	\$16.05	\$0.00	\$61.26
	06/01/2024	\$31.68	\$14.25	\$16.05	\$0.00	\$61.98
	12/01/2024	\$32.48	\$14.25	\$16.05	\$0.00	\$62.78
	06/01/2025	\$33.20	\$14.25	\$16.05	\$0.00	\$63.50
	12/01/2025	\$34.00	\$14.25	\$16.05	\$0.00	\$64.30
	06/01/2026	\$34.72	\$14.25	\$16.05	\$0.00	\$65.02
	12/01/2026	\$35.52	\$14.25	\$16.05	\$0.00	\$65.82

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OTHER POWER DRIVEN EQUIPMENT - CLASS II <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2023	\$56.06	\$8.65	\$23.05	\$0.00	\$87.76
	07/01/2023	\$57.26	\$8.65	\$23.05	\$0.00	\$88.96
	01/01/2024	\$58.46	\$8.65	\$23.05	\$0.00	\$90.16
	07/01/2024	\$59.66	\$8.65	\$23.05	\$0.00	\$91.36
	01/01/2025	\$60.86	\$8.65	\$23.05	\$0.00	\$92.56

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$8.65	\$0.00	\$0.00	\$37.28
2	55	\$31.49	\$8.65	\$6.27	\$0.00	\$46.41
3	60	\$34.36	\$8.65	\$6.84	\$0.00	\$49.85
4	65	\$37.22	\$8.65	\$7.41	\$0.00	\$53.28
5	70	\$40.08	\$8.65	\$19.63	\$0.00	\$68.36
6	75	\$42.95	\$8.65	\$20.20	\$0.00	\$71.80
7	80	\$45.81	\$8.65	\$20.77	\$0.00	\$75.23
8	90	\$51.53	\$8.65	\$21.91	\$0.00	\$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2023	\$46.96	\$8.65	\$23.05	\$0.00	\$78.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. <i>PAINTERS LOCAL 35 - ZONE 2</i>	07/01/2023	\$48.16	\$8.65	\$23.05	\$0.00	\$79.86
	01/01/2024	\$49.36	\$8.65	\$23.05	\$0.00	\$81.06
	07/01/2024	\$50.56	\$8.65	\$23.05	\$0.00	\$82.26
	01/01/2025	\$51.76	\$8.65	\$23.05	\$0.00	\$83.46

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.48	\$8.65	\$0.00	\$0.00	\$32.13
2	55	\$25.83	\$8.65	\$6.27	\$0.00	\$40.75
3	60	\$28.18	\$8.65	\$6.84	\$0.00	\$43.67
4	65	\$30.52	\$8.65	\$7.41	\$0.00	\$46.58
5	70	\$32.87	\$8.65	\$19.63	\$0.00	\$61.15
6	75	\$35.22	\$8.65	\$20.20	\$0.00	\$64.07
7	80	\$37.57	\$8.65	\$20.77	\$0.00	\$66.99
8	90	\$42.26	\$8.65	\$21.91	\$0.00	\$72.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.08	\$8.65	\$0.00	\$0.00	\$32.73
2	55	\$26.49	\$8.65	\$6.27	\$0.00	\$41.41
3	60	\$28.90	\$8.65	\$6.84	\$0.00	\$44.39
4	65	\$31.30	\$8.65	\$7.41	\$0.00	\$47.36
5	70	\$33.71	\$8.65	\$19.63	\$0.00	\$61.99
6	75	\$36.12	\$8.65	\$20.20	\$0.00	\$64.97
7	80	\$38.53	\$8.65	\$20.77	\$0.00	\$67.95
8	90	\$43.34	\$8.65	\$21.91	\$0.00	\$73.90

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2023	\$45.02	\$8.65	\$23.05	\$0.00	\$76.72
PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$46.22	\$8.65	\$23.05	\$0.00	\$77.92
	01/01/2024	\$47.42	\$8.65	\$23.05	\$0.00	\$79.12
	07/01/2024	\$48.62	\$8.65	\$23.05	\$0.00	\$80.32
	01/01/2025	\$49.82	\$8.65	\$23.05	\$0.00	\$81.52

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.51	\$8.65	\$0.00	\$0.00	\$31.16
2	55	\$24.76	\$8.65	\$6.27	\$0.00	\$39.68
3	60	\$27.01	\$8.65	\$6.84	\$0.00	\$42.50
4	65	\$29.26	\$8.65	\$7.41	\$0.00	\$45.32
5	70	\$31.51	\$8.65	\$19.63	\$0.00	\$59.79
6	75	\$33.77	\$8.65	\$20.20	\$0.00	\$62.62
7	80	\$36.02	\$8.65	\$20.77	\$0.00	\$65.44
8	90	\$40.52	\$8.65	\$21.91	\$0.00	\$71.08

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.11	\$8.65	\$0.00	\$0.00	\$31.76
2	55	\$25.42	\$8.65	\$6.27	\$0.00	\$40.34
3	60	\$27.73	\$8.65	\$6.84	\$0.00	\$43.22
4	65	\$30.04	\$8.65	\$19.06	\$0.00	\$57.75
5	70	\$32.35	\$8.65	\$19.63	\$0.00	\$60.63
6	75	\$34.67	\$8.65	\$20.20	\$0.00	\$63.52
7	80	\$36.98	\$8.65	\$20.77	\$0.00	\$66.40
8	90	\$41.60	\$8.65	\$21.91	\$0.00	\$72.16

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2023	\$45.56	\$8.65	\$23.05	\$0.00	\$77.26
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$46.76	\$8.65	\$23.05	\$0.00	\$78.46
	01/01/2024	\$47.96	\$8.65	\$23.05	\$0.00	\$79.66
	07/01/2024	\$49.16	\$8.65	\$23.05	\$0.00	\$80.86
	01/01/2025	\$50.36	\$8.65	\$23.05	\$0.00	\$82.06

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$8.65	\$0.00	\$0.00	\$31.43
2	55	\$25.06	\$8.65	\$6.27	\$0.00	\$39.98
3	60	\$27.34	\$8.65	\$6.84	\$0.00	\$42.83
4	65	\$29.61	\$8.65	\$7.41	\$0.00	\$45.67
5	70	\$31.89	\$8.65	\$19.63	\$0.00	\$60.17
6	75	\$34.17	\$8.65	\$20.20	\$0.00	\$63.02
7	80	\$36.45	\$8.65	\$20.77	\$0.00	\$65.87
8	90	\$41.00	\$8.65	\$21.91	\$0.00	\$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$8.65	\$0.00	\$0.00	\$32.03
2	55	\$25.72	\$8.65	\$6.27	\$0.00	\$40.64
3	60	\$28.06	\$8.65	\$6.84	\$0.00	\$43.55
4	65	\$30.39	\$8.65	\$7.41	\$0.00	\$46.45
5	70	\$32.73	\$8.65	\$19.63	\$0.00	\$61.01
6	75	\$35.07	\$8.65	\$20.20	\$0.00	\$63.92
7	80	\$37.41	\$8.65	\$20.77	\$0.00	\$66.83
8	90	\$42.08	\$8.65	\$21.91	\$0.00	\$72.64

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	01/01/2023	\$43.62	\$8.65	\$23.05	\$0.00	\$75.32
PAINTERS LOCAL 35 - ZONE 2	07/01/2023	\$44.82	\$8.65	\$23.05	\$0.00	\$76.52
	01/01/2024	\$46.02	\$8.65	\$23.05	\$0.00	\$77.72
	07/01/2024	\$47.22	\$8.65	\$23.05	\$0.00	\$78.92
	01/01/2025	\$48.42	\$8.65	\$23.05	\$0.00	\$80.12

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.81	\$8.65	\$0.00	\$0.00	\$30.46
2	55	\$23.99	\$8.65	\$6.27	\$0.00	\$38.91
3	60	\$26.17	\$8.65	\$6.84	\$0.00	\$41.66
4	65	\$28.35	\$8.65	\$7.41	\$0.00	\$44.41
5	70	\$30.53	\$8.65	\$19.63	\$0.00	\$58.81
6	75	\$32.72	\$8.65	\$20.20	\$0.00	\$61.57
7	80	\$34.90	\$8.65	\$20.77	\$0.00	\$64.32
8	90	\$39.26	\$8.65	\$21.91	\$0.00	\$69.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.41	\$8.65	\$0.00	\$0.00	\$31.06
2	55	\$24.65	\$8.65	\$6.27	\$0.00	\$39.57
3	60	\$26.89	\$8.65	\$6.84	\$0.00	\$42.38
4	65	\$29.13	\$8.65	\$7.41	\$0.00	\$45.19
5	70	\$31.37	\$8.65	\$19.63	\$0.00	\$59.65
6	75	\$33.62	\$8.65	\$20.20	\$0.00	\$62.47
7	80	\$35.86	\$8.65	\$20.77	\$0.00	\$65.28
8	90	\$40.34	\$8.65	\$21.91	\$0.00	\$70.90

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY)	12/01/2022	\$36.56	\$9.35	\$16.89	\$0.00	\$62.80
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	06/01/2023	\$37.46	\$9.35	\$16.89	\$0.00	\$63.70
	12/01/2023	\$38.36	\$9.35	\$16.89	\$0.00	\$64.60
	06/01/2024	\$39.69	\$9.35	\$16.89	\$0.00	\$65.93
	12/01/2024	\$41.02	\$9.35	\$16.89	\$0.00	\$67.26
	06/01/2025	\$42.41	\$9.35	\$16.89	\$0.00	\$68.65
	12/01/2025	\$43.79	\$9.35	\$16.89	\$0.00	\$70.03
	06/01/2026	\$45.23	\$9.35	\$16.89	\$0.00	\$71.47
	12/01/2026	\$46.67	\$9.35	\$16.89	\$0.00	\$72.91

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

PANEL & PICKUP TRUCKS DRIVER	12/01/2021	\$35.78	\$13.41	\$16.01	\$0.00	\$65.20
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B						

PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK)	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						

For apprentice rates see "Apprentice- PILE DRIVER"

PILE DRIVER	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER LOCAL 56 (ZONE 1)						

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PILE DRIVER - Local 56 Zone 1

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.54	\$9.40	\$23.12	\$0.00	\$57.06
2	60	\$29.44	\$9.40	\$23.12	\$0.00	\$61.96
3	70	\$34.35	\$9.40	\$23.12	\$0.00	\$66.87
4	75	\$36.80	\$9.40	\$23.12	\$0.00	\$69.32
5	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
6	80	\$39.26	\$9.40	\$23.12	\$0.00	\$71.78
7	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68
8	90	\$44.16	\$9.40	\$23.12	\$0.00	\$76.68

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$34.01/ 3&4 \$41.46/ 5&6 \$62.80/ 7&8 \$69.25

Apprentice to Journeyworker Ratio:1:5

PIPELAYER LABORERS - ZONE 2	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2022	\$36.81	\$9.35	\$16.89	\$0.00	\$63.05
	06/01/2023	\$37.71	\$9.35	\$16.89	\$0.00	\$63.95
	12/01/2023	\$38.61	\$9.35	\$16.89	\$0.00	\$64.85
	06/01/2024	\$39.94	\$9.35	\$16.89	\$0.00	\$66.18
	12/01/2024	\$41.27	\$9.35	\$16.89	\$0.00	\$67.51
	06/01/2025	\$42.66	\$9.35	\$16.89	\$0.00	\$68.90
	12/01/2025	\$44.04	\$9.35	\$16.89	\$0.00	\$70.28
	06/01/2026	\$45.48	\$9.35	\$16.89	\$0.00	\$71.72
	12/01/2026	\$46.92	\$9.35	\$16.89	\$0.00	\$73.16

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

PLUMBER & PIPEFITTER PLUMBERS & PIPEFITTERS LOCAL 51	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
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Apprentice - PLUMBER/PIPEFITTER - Local 51

Effective Date - 08/30/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.60	\$10.15	\$2.50	\$0.00	\$31.25
2	50	\$23.25	\$10.15	\$2.50	\$0.00	\$35.90
3	60	\$27.89	\$10.15	\$8.80	\$0.00	\$46.84
4	70	\$32.54	\$10.15	\$14.08	\$0.00	\$56.77
5	80	\$37.19	\$10.15	\$17.60	\$0.00	\$64.94

Notes:
Steps 2000hrs. Prior 9/1/05; 40/40/45/50/55/60/65/75/80/85

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
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For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$36.81	\$9.35	\$16.89	\$0.00	\$63.05
	06/01/2023	\$37.71	\$9.35	\$16.89	\$0.00	\$63.95
	12/01/2023	\$38.61	\$9.35	\$16.89	\$0.00	\$64.85
	06/01/2024	\$39.94	\$9.35	\$16.89	\$0.00	\$66.18
	12/01/2024	\$41.27	\$9.35	\$16.89	\$0.00	\$67.51
	06/01/2025	\$42.66	\$9.35	\$16.89	\$0.00	\$68.90
	12/01/2025	\$44.04	\$9.35	\$16.89	\$0.00	\$70.28
	06/01/2026	\$45.48	\$9.35	\$16.89	\$0.00	\$71.72
	12/01/2026	\$46.92	\$9.35	\$16.89	\$0.00	\$73.16

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	12/01/2022	\$38.16	\$9.10	\$16.64	\$0.00	\$63.90
	06/01/2023	\$39.06	\$9.10	\$16.64	\$0.00	\$64.80
	12/01/2023	\$39.96	\$9.10	\$16.64	\$0.00	\$65.70

For apprentice rates see "Apprentice- LABORER"

POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$37.56	\$9.35	\$16.89	\$0.00	\$63.80
	06/01/2023	\$38.46	\$9.35	\$16.89	\$0.00	\$64.70
	12/01/2023	\$39.36	\$9.35	\$16.89	\$0.00	\$65.60
	06/01/2024	\$40.69	\$9.35	\$16.89	\$0.00	\$66.93
	12/01/2024	\$42.02	\$9.35	\$16.89	\$0.00	\$68.26
	06/01/2025	\$43.41	\$9.35	\$16.89	\$0.00	\$69.65
	12/01/2025	\$44.79	\$9.35	\$16.89	\$0.00	\$71.03
	06/01/2026	\$46.23	\$9.35	\$16.89	\$0.00	\$72.47
	12/01/2026	\$47.67	\$9.35	\$16.89	\$0.00	\$73.91

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$35.08	\$14.25	\$16.05	\$0.00	\$65.38
	06/01/2023	\$35.90	\$14.25	\$16.05	\$0.00	\$66.20
	12/01/2023	\$36.72	\$14.25	\$16.05	\$0.00	\$67.02
	06/01/2024	\$37.57	\$14.25	\$16.05	\$0.00	\$67.87
	12/01/2024	\$38.52	\$14.25	\$16.05	\$0.00	\$68.82
	06/01/2025	\$39.37	\$14.25	\$16.05	\$0.00	\$69.67
	12/01/2025	\$40.32	\$14.25	\$16.05	\$0.00	\$70.62
	06/01/2026	\$41.18	\$14.25	\$16.05	\$0.00	\$71.48
	12/01/2026	\$42.13	\$14.25	\$16.05	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 170 - Dauphinis (Bellingham)</i>	01/01/2023	\$26.40	\$10.26	\$4.75	\$0.00	\$41.41
	12/01/2023	\$27.00	\$10.76	\$5.45	\$0.00	\$43.21
	01/01/2024	\$27.00	\$10.76	\$5.45	\$0.00	\$43.21
	12/01/2024	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
	01/01/2025	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofing &Roofing Damproofg) <i>ROOFERS LOCAL 33</i>	02/01/2023	\$48.53	\$12.78	\$20.20	\$0.00	\$81.51
	08/01/2023	\$50.03	\$12.78	\$20.20	\$0.00	\$83.01
	02/01/2024	\$51.28	\$12.78	\$20.20	\$0.00	\$84.26
	08/01/2024	\$52.78	\$12.78	\$20.20	\$0.00	\$85.76
	02/01/2025	\$54.03	\$12.78	\$20.20	\$0.00	\$87.01
	08/01/2025	\$55.53	\$12.78	\$20.20	\$0.00	\$88.51
	02/01/2026	\$56.78	\$12.78	\$20.20	\$0.00	\$89.76

Apprentice - ROOFER - Local 33

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.27	\$12.78	\$5.59	\$0.00	\$42.64
2	60	\$29.12	\$12.78	\$20.20	\$0.00	\$62.10
3	65	\$31.54	\$12.78	\$20.20	\$0.00	\$64.52
4	75	\$36.40	\$12.78	\$20.20	\$0.00	\$69.38
5	85	\$41.25	\$12.78	\$20.20	\$0.00	\$74.23

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.02	\$12.78	\$5.59	\$0.00	\$43.39
2	60	\$30.02	\$12.78	\$20.20	\$0.00	\$63.00
3	65	\$32.52	\$12.78	\$20.20	\$0.00	\$65.50
4	75	\$37.52	\$12.78	\$20.20	\$0.00	\$70.50
5	85	\$42.53	\$12.78	\$20.20	\$0.00	\$75.51

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
 Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
 (Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE <i>ROOFERS LOCAL 33</i>	02/01/2023	\$48.78	\$12.78	\$20.20	\$0.00	\$81.76
	08/01/2023	\$50.28	\$12.78	\$20.20	\$0.00	\$83.26
	02/01/2024	\$51.53	\$12.78	\$20.20	\$0.00	\$84.51
	08/01/2024	\$53.03	\$12.78	\$20.20	\$0.00	\$86.01
	02/01/2025	\$54.28	\$12.78	\$20.20	\$0.00	\$87.26
	08/01/2025	\$55.78	\$12.78	\$20.20	\$0.00	\$88.76
	02/01/2026	\$57.03	\$12.78	\$20.20	\$0.00	\$90.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2023	\$55.31	\$14.11	\$26.64	\$2.83	\$98.89
	08/01/2023	\$57.01	\$14.11	\$26.64	\$2.83	\$100.59
	02/01/2024	\$58.71	\$14.11	\$26.64	\$2.83	\$102.29
	08/01/2024	\$60.46	\$14.11	\$26.64	\$2.83	\$104.04
	02/01/2025	\$62.21	\$14.11	\$26.64	\$2.83	\$105.79
	08/01/2025	\$64.06	\$14.11	\$26.64	\$2.83	\$107.64
	02/01/2026	\$66.01	\$14.11	\$26.64	\$2.83	\$109.59

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 17-A

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
2	42	\$23.23	\$14.11	\$6.13	\$0.00	\$43.47
3	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
4	47	\$26.00	\$14.11	\$11.90	\$1.54	\$53.55
5	52	\$28.76	\$14.11	\$12.88	\$1.65	\$57.40
6	52	\$28.76	\$14.11	\$13.13	\$1.65	\$57.65
7	60	\$33.19	\$14.11	\$14.54	\$1.83	\$63.67
8	65	\$35.95	\$14.11	\$15.52	\$1.94	\$67.52
9	75	\$41.48	\$14.11	\$17.48	\$2.16	\$75.23
10	85	\$47.01	\$14.11	\$18.94	\$2.36	\$82.42

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$23.94	\$14.11	\$6.13	\$0.00	\$44.18
2	42	\$23.94	\$14.11	\$6.13	\$0.00	\$44.18
3	47	\$26.79	\$14.11	\$11.90	\$1.58	\$54.38
4	47	\$26.79	\$14.11	\$11.90	\$1.58	\$54.38
5	52	\$29.65	\$14.11	\$12.88	\$1.70	\$58.34
6	52	\$29.65	\$14.11	\$13.13	\$1.70	\$58.59
7	60	\$34.21	\$14.11	\$14.54	\$1.89	\$64.75
8	65	\$37.06	\$14.11	\$15.52	\$2.00	\$68.69
9	75	\$42.76	\$14.11	\$17.48	\$2.23	\$76.58
10	85	\$48.46	\$14.11	\$18.94	\$2.45	\$83.96

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SPECIALIZED EARTH MOVING EQUIP < 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.53	\$13.41	\$16.01	\$0.00	\$65.95
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1</i>	03/01/2023	\$66.20	\$10.90	\$23.20	\$0.00	\$100.30
	10/01/2023	\$67.95	\$10.90	\$23.20	\$0.00	\$102.05
	03/01/2024	\$69.75	\$10.90	\$23.20	\$0.00	\$103.85
	10/01/2024	\$71.55	\$10.90	\$23.20	\$0.00	\$105.65
	03/01/2025	\$73.35	\$10.90	\$23.20	\$0.00	\$107.45

Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$23.17	\$10.90	\$9.70	\$0.00	\$43.77
2	40	\$26.48	\$10.90	\$9.70	\$0.00	\$47.08
3	45	\$29.79	\$10.90	\$9.70	\$0.00	\$50.39
4	50	\$33.10	\$10.90	\$9.70	\$0.00	\$53.70
5	55	\$36.41	\$10.90	\$9.70	\$0.00	\$57.01
6	60	\$39.72	\$10.90	\$11.20	\$0.00	\$61.82
7	65	\$43.03	\$10.90	\$11.20	\$0.00	\$65.13
8	70	\$46.34	\$10.90	\$11.20	\$0.00	\$68.44
9	75	\$49.65	\$10.90	\$11.20	\$0.00	\$71.75
10	80	\$52.96	\$10.90	\$11.20	\$0.00	\$75.06

Effective Date - 10/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$23.78	\$10.90	\$9.70	\$0.00	\$44.38
2	40	\$27.18	\$10.90	\$9.70	\$0.00	\$47.78
3	45	\$30.58	\$10.90	\$9.70	\$0.00	\$51.18
4	50	\$33.98	\$10.90	\$9.70	\$0.00	\$54.58
5	55	\$37.37	\$10.90	\$9.70	\$0.00	\$57.97
6	60	\$40.77	\$10.90	\$11.20	\$0.00	\$62.87
7	65	\$44.17	\$10.90	\$11.20	\$0.00	\$66.27
8	70	\$47.57	\$10.90	\$11.20	\$0.00	\$69.67
9	75	\$50.96	\$10.90	\$11.20	\$0.00	\$73.06
10	80	\$54.36	\$10.90	\$11.20	\$0.00	\$76.46

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

STEAM BOILER OPERATOR	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
OPERATING ENGINEERS LOCAL 4	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 223</i>	09/01/2022	\$38.16	\$11.25	\$13.31	\$0.00	\$62.72
	09/01/2023	\$39.40	\$11.50	\$13.91	\$0.00	\$64.81
	09/01/2024	\$40.69	\$11.75	\$14.53	\$0.00	\$66.97

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 223

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes: See Electrician Apprentice Wages

Telecom Apprentice Wages shall be the same as the Electrician Apprentice Wages

Apprentice to Journeyworker Ratio:2:3***

TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2023	\$59.29	\$11.49	\$22.34	\$0.00	\$93.12
	08/01/2023	\$61.34	\$11.49	\$22.34	\$0.00	\$95.17
	02/01/2024	\$62.59	\$11.49	\$22.34	\$0.00	\$96.42
	08/01/2024	\$64.69	\$11.49	\$22.34	\$0.00	\$98.52
	02/01/2025	\$65.99	\$11.49	\$22.34	\$0.00	\$99.82
	08/01/2025	\$68.14	\$11.49	\$22.34	\$0.00	\$101.97
	02/01/2026	\$69.49	\$11.49	\$22.34	\$0.00	\$103.32
	08/01/2026	\$71.69	\$11.49	\$22.34	\$0.00	\$105.52
	02/01/2027	\$73.09	\$11.49	\$22.34	\$0.00	\$106.92

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.65	\$11.49	\$22.34	\$0.00	\$63.48
2	60	\$35.57	\$11.49	\$22.34	\$0.00	\$69.40
3	70	\$41.50	\$11.49	\$22.34	\$0.00	\$75.33
4	80	\$47.43	\$11.49	\$22.34	\$0.00	\$81.26
5	90	\$53.36	\$11.49	\$22.34	\$0.00	\$87.19

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.67	\$11.49	\$22.34	\$0.00	\$64.50
2	60	\$36.80	\$11.49	\$22.34	\$0.00	\$70.63
3	70	\$42.94	\$11.49	\$22.34	\$0.00	\$76.77
4	80	\$49.07	\$11.49	\$22.34	\$0.00	\$82.90
5	90	\$55.21	\$11.49	\$22.34	\$0.00	\$89.04

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$46.58	\$9.35	\$17.97	\$0.00	\$73.90
	06/01/2023	\$47.58	\$9.35	\$17.97	\$0.00	\$74.90
	12/01/2023	\$48.83	\$9.35	\$17.97	\$0.00	\$76.15
	06/01/2024	\$50.31	\$9.35	\$17.97	\$0.00	\$77.63
	12/01/2024	\$51.78	\$9.35	\$17.97	\$0.00	\$79.10
	06/01/2025	\$53.28	\$9.35	\$17.97	\$0.00	\$80.60
	12/01/2025	\$54.78	\$9.35	\$17.97	\$0.00	\$82.10
	06/01/2026	\$56.33	\$9.35	\$17.97	\$0.00	\$83.65
	12/01/2026	\$57.83	\$9.35	\$17.97	\$0.00	\$85.15

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.70	\$9.35	\$17.97	\$0.00	\$70.02
	06/01/2023	\$43.70	\$9.35	\$17.97	\$0.00	\$71.02
	12/01/2023	\$44.95	\$9.35	\$17.97	\$0.00	\$72.27
	06/01/2024	\$46.43	\$9.35	\$17.97	\$0.00	\$73.75
	12/01/2024	\$47.90	\$9.35	\$17.97	\$0.00	\$75.22
	06/01/2025	\$49.40	\$9.35	\$17.97	\$0.00	\$76.72
	12/01/2025	\$50.90	\$9.35	\$17.97	\$0.00	\$78.22
	06/01/2026	\$52.45	\$9.35	\$17.97	\$0.00	\$79.77
	12/01/2026	\$53.95	\$9.35	\$17.97	\$0.00	\$81.27

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	12/01/2022	\$42.58	\$9.35	\$17.97	\$0.00	\$69.90
	06/01/2023	\$43.58	\$9.35	\$17.97	\$0.00	\$70.90
	12/01/2023	\$44.83	\$9.35	\$17.97	\$0.00	\$72.15
	06/01/2024	\$46.31	\$9.35	\$17.97	\$0.00	\$73.63
	12/01/2024	\$47.78	\$9.35	\$17.97	\$0.00	\$75.10
	06/01/2025	\$49.28	\$9.35	\$17.97	\$0.00	\$76.60
	12/01/2025	\$50.78	\$9.35	\$17.97	\$0.00	\$78.10
	06/01/2026	\$52.33	\$9.35	\$17.97	\$0.00	\$79.65
	12/01/2026	\$53.83	\$9.35	\$17.97	\$0.00	\$81.15
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.05	\$14.25	\$16.05	\$0.00	\$83.35
	06/01/2023	\$54.29	\$14.25	\$16.05	\$0.00	\$84.59
	12/01/2023	\$55.53	\$14.25	\$16.05	\$0.00	\$85.83
	06/01/2024	\$56.81	\$14.25	\$16.05	\$0.00	\$87.11
	12/01/2024	\$58.25	\$14.25	\$16.05	\$0.00	\$88.55
	06/01/2025	\$59.53	\$14.25	\$16.05	\$0.00	\$89.83
	12/01/2025	\$60.97	\$14.25	\$16.05	\$0.00	\$91.27
	06/01/2026	\$62.25	\$14.25	\$16.05	\$0.00	\$92.55
	12/01/2026	\$63.69	\$14.25	\$16.05	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.82	\$13.41	\$16.01	\$0.00	\$66.24
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$54.81	\$9.35	\$18.42	\$0.00	\$82.58
	06/01/2023	\$55.81	\$9.35	\$18.42	\$0.00	\$83.58
	12/01/2023	\$57.06	\$9.35	\$18.42	\$0.00	\$84.83
	06/01/2024	\$58.54	\$9.35	\$18.42	\$0.00	\$86.31
	12/01/2024	\$60.01	\$9.35	\$18.42	\$0.00	\$87.78
	06/01/2025	\$61.51	\$9.35	\$18.42	\$0.00	\$89.28
	12/01/2025	\$63.01	\$9.35	\$18.42	\$0.00	\$90.78
	06/01/2026	\$64.56	\$9.35	\$18.42	\$0.00	\$92.33
	12/01/2026	\$66.06	\$9.35	\$18.42	\$0.00	\$93.83
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2022	\$56.81	\$9.35	\$18.42	\$0.00	\$84.58
	06/01/2023	\$57.81	\$9.35	\$18.42	\$0.00	\$85.58
	12/01/2023	\$59.06	\$9.35	\$18.42	\$0.00	\$86.83
	06/01/2024	\$60.54	\$9.35	\$18.42	\$0.00	\$88.31
	12/01/2024	\$62.01	\$9.35	\$18.42	\$0.00	\$89.78
	06/01/2025	\$63.51	\$9.35	\$18.42	\$0.00	\$91.28
	12/01/2025	\$65.01	\$9.35	\$18.42	\$0.00	\$92.78
	06/01/2026	\$66.56	\$9.35	\$18.42	\$0.00	\$94.33
	12/01/2026	\$68.06	\$9.35	\$18.42	\$0.00	\$95.83
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$46.88	\$9.35	\$18.42	\$0.00	\$74.65
	06/01/2023	\$47.88	\$9.35	\$18.42	\$0.00	\$75.65
	12/01/2023	\$49.13	\$9.35	\$18.42	\$0.00	\$76.90
	06/01/2024	\$50.61	\$9.35	\$18.42	\$0.00	\$78.38
	12/01/2024	\$52.08	\$9.35	\$18.42	\$0.00	\$79.85
	06/01/2025	\$53.58	\$9.35	\$18.42	\$0.00	\$81.35
	12/01/2025	\$55.08	\$9.35	\$18.42	\$0.00	\$82.85
	06/01/2026	\$56.63	\$9.35	\$18.42	\$0.00	\$84.40
	12/01/2026	\$58.13	\$9.35	\$18.42	\$0.00	\$85.90
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2022	\$48.88	\$9.35	\$18.42	\$0.00	\$76.65
	06/01/2023	\$49.88	\$9.35	\$18.42	\$0.00	\$77.65
	12/01/2023	\$51.13	\$9.35	\$18.42	\$0.00	\$78.90
	06/01/2024	\$52.61	\$9.35	\$18.42	\$0.00	\$80.38
	12/01/2024	\$54.08	\$9.35	\$18.42	\$0.00	\$81.85
	06/01/2025	\$55.58	\$9.35	\$18.42	\$0.00	\$83.35
	12/01/2025	\$57.08	\$9.35	\$18.42	\$0.00	\$84.85
	06/01/2026	\$58.63	\$9.35	\$18.42	\$0.00	\$86.40
	12/01/2026	\$60.13	\$9.35	\$18.42	\$0.00	\$87.90
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	12/01/2022	\$37.41	\$9.10	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.31	\$9.10	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.21	\$9.10	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2022	\$36.81	\$9.35	\$16.89	\$0.00	\$63.05
	06/01/2023	\$37.71	\$9.35	\$16.89	\$0.00	\$63.95
	12/01/2023	\$38.61	\$9.35	\$16.89	\$0.00	\$64.85
	06/01/2024	\$39.94	\$9.35	\$16.89	\$0.00	\$66.18
	12/01/2024	\$41.27	\$9.35	\$16.89	\$0.00	\$67.51
	06/01/2025	\$42.66	\$9.35	\$16.89	\$0.00	\$68.90
	12/01/2025	\$44.04	\$9.35	\$16.89	\$0.00	\$70.28
	06/01/2026	\$45.48	\$9.35	\$16.89	\$0.00	\$71.72
	12/01/2026	\$46.92	\$9.35	\$16.89	\$0.00	\$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2022	\$53.63	\$14.25	\$16.05	\$0.00	\$83.93
	06/01/2023	\$54.88	\$14.25	\$16.05	\$0.00	\$85.18
	12/01/2023	\$56.13	\$14.25	\$16.05	\$0.00	\$86.43
	06/01/2024	\$57.43	\$14.25	\$16.05	\$0.00	\$87.73
	12/01/2024	\$58.88	\$14.25	\$16.05	\$0.00	\$89.18
	06/01/2025	\$60.18	\$14.25	\$16.05	\$0.00	\$90.48
	12/01/2025	\$61.63	\$14.25	\$16.05	\$0.00	\$91.93
	06/01/2026	\$62.93	\$14.25	\$16.05	\$0.00	\$93.23
	12/01/2026	\$64.38	\$14.25	\$16.05	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WATER METER INSTALLER <i>PLUMBERS & PIPEFITTERS LOCAL 51</i>	08/30/2021	\$46.49	\$10.15	\$19.95	\$0.00	\$76.59
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.

**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

APPENDIX G

Davis Bacon Act Requirements

All construction projects are subject to the Davis Bacon wage rate requirements and must include the appropriate sections of the following document in its entirety in the contract documents.

The vast majority of SRF projects will be bid by Governmental Entities (i.e., Cities, Towns, Authorities, Water Districts, Wastewater Districts). These projects must include the following language in construction contracts:

I.3. Contract and Subcontract Provisions

I.4. Contract Provisions for Contracts in Excess of \$100,000 (if applicable)

I.5. Compliance Verification

This language may be found on pages DB-3-DB-11.

In certain cases, SRF projects may be bid by non-Governmental Entities (i.e., private water companies, private PWSs, etc.). These projects must include the following language in construction contracts:

II.3. Contract and Subcontract Provisions

II.4. Contract Provisions for Contracts in Excess of \$100,000 (if applicable)

II.5. Compliance Verification

This language may be found on pages DB-11-DB-21

Preamble

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

Occasionally, the subrecipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section II-3(ii)(A), below and for compliance as described in Section II-5.

I. Requirements For Subrecipients That Are Governmental Entities:

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has

questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact Valerie Marshall at EPA Region 1 (617-918-1674) for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <https://www.dol.gov/whd/govcontracts/dbra.htm>

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

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

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

(i) While the solicitation remains open, the subrecipient shall monitor www.wdol.gov weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a 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 2012 Appropriations Act, the following clauses:

(1) Minimum wages.

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

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein:

Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for 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 subrecipient(s) 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 subrecipient (s) 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 request 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 subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, 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 of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

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

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

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, 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 subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/whd/forms/wh347.pdf> 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 subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

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

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

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

- (5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- (6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
- (7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- (8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29

CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

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

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

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

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

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other

Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a) The subrecipient 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 subrecipient 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.

(b) The subrecipient 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 subrecipient 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. Subrecipients 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. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient 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 subrecipient 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 subrecipient 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. Subrecipients 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 subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients 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 https://www.dol.gov/whd/whd_district_offices.pdf.

II. Requirements For Subrecipients That Are Not Governmental Entities

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance with respect to subrecipients that are not governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient for guidance. If a State recipient needs guidance, the recipient may contact Valerie Marshall at EPA Region 1 (617-918-1674) for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <https://www.dol.gov/whd/govcontracts/dbra.htm>

Under these terms and conditions, the subrecipient must submit its proposed DB wage determinations to the State recipient for approval prior to including the wage determination in any solicitation, contract task orders, work assignments, or similar instruments to existing contractors.

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

DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients must obtain proposed wage determinations for specific localities at www.wdol.gov. After the Subrecipient obtains its proposed wage determination, it must submit the wage determination to (insert contact information for State recipient DB point of contact for wage determination) for approval prior to inserting the wage determination into a solicitation, contract or issuing task orders, work assignments or similar instruments to existing contractors (ordering instruments unless subsequently directed otherwise by the State recipient Award Official).

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

(i) While the solicitation remains open, the subrecipient shall monitor www.wdol.gov on a weekly basis to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor www.wdol.gov on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(c) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from www.wdol.gov into the ordering instrument.

(d) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(e) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

3. Contract and Subcontract provisions.

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a 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 2011 Full-Year Continuing Appropriation, the following clauses:

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.dol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for 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 subrecipient(s) 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 subrecipient(s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request, and the local wage determination, 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 Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

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

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

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, 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 subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is

available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/whd/forms/wh347.pdf> 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 subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

- (1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

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

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of

fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

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

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

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (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 subrecipient shall upon the request of the EPA Award Official or an authorized representative of the Department of Labor, 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) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

5. Compliance Verification

(a). The subrecipient 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 subrecipient 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.

(b) The subrecipient 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 subrecipient 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. Subrecipients 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. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c). The subrecipient 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 subrecipient 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 subrecipient 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. Subrecipients 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 subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d). The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients 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 https://www.dol.gov/whd/whd_district_offices.pdf.

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"General Decision Number: MA20230008 03/31/2023

Superseded General Decision Number: MA20220008

State: Massachusetts

Construction Types: Heavy (Heavy and Marine)

Counties: Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth and Suffolk Counties in Massachusetts.

HEAVY AND MARINE CONTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$16.20 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 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number Publication Date

0	01/06/2023
1	01/27/2023
2	02/03/2023
3	03/03/2023
4	03/17/2023
5	03/24/2023
6	03/31/2023

BOIL0029-001 01/01/2021

	Rates	Fringes
BOILERMAKER.....	\$ 45.87	29.02

BRMA0001-011 02/01/2023

FOXBORO CHAPTER

BRISTOL (Attleboro, Berkley, Dighton, Mansfield, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Taunton); NORFOLK, (Bellingham, Canton, Dedham, Foxboro, Franklin, Norfolk, Norwood, Plainville, Sharon, Walpole, Westwood, Wrentham); and PLYMOUTH (Lakeville)

	Rates	Fringes
Bricklayer/Cement Mason.....	\$ 60.35	34.40

BRMA0001-012 02/01/2023

LOWELL CHAPTER

MIDDLESEX (Acton, Ashby, Ayer, Bedford, Billerica, Boxboro, Carlisle, Chemsford, Dracut, Dunstabale, Ft Devens, Groton, Littleton, Lowell, North Acton, Pepperell, Shirley, South Acton, Tewksbury, Townsend, Tyngsboro, West Acton, Westford, Wilmington)

	Rates	Fringes
BRICKLAYER.....	\$ 58.21	33.71

BRMA0001-013 02/01/2023

LOWELL CHAPTER

MIDDLESEX (Ashland, Framingham, Holliston, Hopkinton, Hudson, Maynard, Natick, Sherborn, Stow); and NORFOLK (Medfield, Medway, Millis)

	Rates	Fringes
BRICKLAYER.....	\$ 60.35	34.40

BRMA0003-001 02/01/2023

	Rates	Fringes
Marble & Tile Finisher.....	\$ 46.25	32.43
Marble, Tile & Terrazzo Workers.....	\$ 60.37	34.37
TERRAZZO FINISHER.....	\$ 59.29	34.21

BRMA0003-003 02/01/2023

BOSTON CHAPTER

MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford, Melrose, Somerville); NORFOLK (Brookline, Milton); and SUFFOLK

	Rates	Fringes
BRICKLAYER.....	\$ 60.35	34.40

BRMA0003-011 02/01/2023

LYNN CHAPTER

ESSEX (Amesbury, Andover, Beverly, Boxford, Danvers, Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill, Ipswich, Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac, Methuen, Middleton, Nahant, Newbury, Newburyport, North Andover, Peabody, Rockport, Rowley, Salisbury, Salem, Saugus, Swampscott, Topsfield, Wakefield, Wenham, West Newbury); and MIDDLESEX (North Reading, Reading, Wakefield)

	Rates	Fringes
Bricklayer/Cement Mason.....	\$ 60.35	34.40

BRMA0003-012 02/01/2023

	Rates	Fringes
BRICKLAYER WALTHAM CHAPTER - MIDDLESEX (Belmont, Burlington, Concord, Lexington, Lincoln, Stoneham, Sudbury, Waltham, Watertown, Wayland, Weston, Winchester, Woburn).....	\$ 60.35	34.40

BRMA0003-014 02/01/2023

QUINCY CHAPTER

PLYMOUTH COUNTY (Abington, Bridgewater, Brockton, Carver, Duxbury, East Bridgewater, Halifax, Hanover, Hanson, Hingham, Hull, Kingston, Marshfield, Middleboro, Norwell, Pembroke, Plymouth, Rockland, Scituate, West Bridgewater, Whitman)

	Rates	Fringes
Bricklayer/Cement Mason.....	\$ 60.35	34.40

BRMA0003-025 02/01/2023

NEW BEDFORD CHAPTER

BARNSTABLE; BRISTOL (Acushnet, Dartmouth, Fairhaven, Fall River, Freetown, New Bedford, Somerset, Swansea, Westport); DUKES; NANTUCKET; PLYMOUTH (Marion, Mattapoisett, Rochester, Wareham)

	Rates	Fringes
Bricklayer/Cement Mason.....	\$ 60.35	34.40

BRMA0003-033 02/01/2023		

NEWTON CHAPTER
MIDDLESEX (Newton); NORFOLK (Dover, Needham, Wellesley)

	Rates	Fringes
Bricklayer, Plasterer.....	\$ 60.35	34.40

CARP0056-001 08/01/2022		

All of SUFFOLK COUNTY; and those areas of BARNSTABLE, BRISTOL, ESSEX, MIDDLESEX, NORFOLK, and PLYMOUTH COUNTIES situated INSIDE Boston Beltway (I-495) and North of Cape Cod Canal. ALL of DUKES and NANTUCKET COUNTIES

	Rates	Fringes
PILEDRIVERMAN.....	\$ 52.15	34.10

CARP0056-002 08/01/2022		

The areas of BARNSTABLE, BRISTOL, PLYMOUTH, and NORFOLK COUNTIES situated OUTSIDE Boston Beltway (I-495) and South of Cape Cod Canal

	Rates	Fringes
PILEDRIVERMAN.....	\$ 48.34	34.10

CARP0056-003 08/01/2022		

Those areas of ESSEX and MIDDLESEX COUNTIES situated OUTSIDE Boston Beltway (I-495)

	Rates	Fringes
PILEDRIVERMAN.....	\$ 45.74	34.10

CARP0056-004 08/01/2022		

	Rates	Fringes
DIVER TENDER.....	\$ 52.15	34.10
DIVER.....	\$ 68.70	35.57

CARP0327-002 03/01/2023		

MIDDLESEX (Belmont, Cambridge, Everett, Malden, Medford, Somerville); NORFOLK (Brookline, Dedham, Milton); AND SUFFOLK COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 54.96	29.43

CARP0339-002 03/01/2023

BRISTOL (Attleborough, North Attleborough); ESSEX; MIDDLESEX (Except Belmont, Cambridge, Everett, Malden, Medford, Somerville); AND NORFOLK (Bellingham, Braintree, Canton, Cohasset, Foxboro, Franklin, Medfield, Medway, Millis, Needham, Norfolk, Norwood, Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham) COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 45.12	29.43

CARP0346-001 03/01/2023

NORFOLK (Braintree, Quincy, Cohasset, Weymouth, etc.) PLYMOUTH (Duxbury, Hanover, Hull, Hingham, Marshfield, Norwell, Pembroke Rockland, Scituate)

	Rates	Fringes
CARPENTER.....	\$ 45.12	39.43

CARP0624-002 09/01/2017

DUKES; NANTUCKET

	Rates	Fringes
CARPENTER.....	\$ 46.43	28.35

CARP0624-006 09/01/2017

BARNSTABLE; BRISTOL (Except Attleboro & North Attleboro); NORFOLK (Avon, Holbrook, Randolph, Stoughton); PLYMOUTH (Bridgewater, Kingston, Lakeville, Middleboro, Plymouth, S. Hanover, Whitman)

	Rates	Fringes
CARPENTER.....	\$ 39.28	27.90

CARP1121-001 01/02/2023

SUFFOLK COUNTY

	Rates	Fringes
MILLWRIGHT.....	\$ 46.29	31.18

CARP1121-005 01/02/2023

BARNSTABLE, BRISTOL, DUKES, ESSEX, MIDDLESEX, NANTUCKET, NORFOLK and PLYMOUTH COUNTIES

	Rates	Fringes
MILLWRIGHT.....	\$ 40.94	31.18

ELEC0096-001 09/04/2022

MIDDLESEX (Ashby, Ashland, Ayer, Ft. Devens, Groton, Hopkinton, Hudson, Marlboro, Pepperell, Shirley, Stow, Townsend)

	Rates	Fringes
ELECTRICIAN.....	\$ 45.59	30.92
Teledata System Installer.....	\$ 34.19	29.33

ELEC0099-001 06/01/2021

BRISTOL (Attleboro, North Attleboro, Seekonk)

	Rates	Fringes
ELECTRICIAN.....	\$ 43.61	54.71%
Teledata System Installer.....	\$ 31.21	13.1%+14.93

ELEC0103-002 03/01/2023

ESSEX (Amesbury, Andover, Boxford, Georgetown, Groveland, Haverhill, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, West Newbury); MIDDLESEX (Bedford, Billerica, Boxboro, Burlington, Carlisle, Chelmsford, Dracut, Dunstable littleton, Lowell, North Reading, Tewksbury, Tyngsboro, Westford, Wilmington)

	Rates	Fringes
ELECTRICIAN.....	\$ 59.23	35.52

ELEC0103-004 03/01/2023

ESSEX (Beverly, Danvers, Essex, Gloucester, Hamilton, Ipswich, Manchester, Marblehead, Middleton, Peabody, Rockport, Salem, Topsfield, Wenham)

	Rates	Fringes
ELECTRICIAN.....	\$ 59.23	35.52

ELEC0103-005 03/01/2023

ESSEX (Lynn, Lynnfield, Nahant, Saugus, Swampscott); MIDDLESEX (Acton, Arlington, Belmont, Cambridge, Concord, Everett, Framingham, Holliston, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Bellingham, Braintree, Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Franklino, Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood, Quincy, Sharon, Walpole, Wellesley, Westwood, Weymouth, Wrentham); PLYMOUTH (Hingham and Hull);SUFFOLK

	Rates	Fringes
ELECTRICIAN.....	\$ 59.23	35.52

ELEC0104-001 08/29/2022

Rates Fringes

Line Construction:

Cableman.....	\$ 53.06	28.49+A
Equipment Operator.....	\$ 45.10	25.20+A
Groundman.....	\$ 29.18	12.10+A
Lineman.....	\$ 53.06	28.49+A

A. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Christmas Day and Columbus Day, provided the employee has been employed 5 working days prior to any one of the listed holidays.

 ELEC0223-002 09/01/2022

BARNSTABLE, BRISTOL (Except Attleboro, North Attleboro, Seekonk); DUKES; NANTUCKET; PLYMOUTH (Except Hingham and Hull Twp); NORFOLK (Avon, Halbrook, Randolph, Sloughton)

	Rates	Fringes
ELECTRICIAN.....	\$ 46.35	31.18%+14.50

 ENGI0004-009 12/01/2021

	Rates	Fringes
Power equipment operators:		
Group 1.....	\$ 51.38	30.10
Group 2.....	\$ 50.83	30.10
Group 3.....	\$ 33.69	30.10
Group 4.....	\$ 41.76	30.10
Group 5.....	\$ 23.48	30.10
Group 6.....	\$ 28.44	30.10

HOURLY PREMIUM FOR BOOM LENGTHS (Including Jib):

Over 150 ft.	+2.18
Over 185 ft.	+3.84
Over 210 ft.	+5.39
Over 250 ft.	+8.16
Over 295 ft.	+11.29
Over 350 ft.	+13.14

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Labor Day, Memorial Day, Independence Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day, Christmas Day

POWER EQUIPMENT OPERATORS CLASSIFICATIONS [HEAVY CONSTRUCTION]

GROUP 1: Power shovel; crane; truck crane; derrick; pile driver; trenching machine; mechanical hoist pavement breaker; cement concrete paver; dragline; hoisting engine; three drum machine; pumpcrete machine; loaders; shovel dozer; front end loader; mucking machine; shaft hoist; steam engine; backhoe; gradall; cable way; fork lift; cherry picker; boring machine; rotary drill; post hole hammer; post hole digger; asphalt plant on job site; concrete batching and/or mixing plant on job site; crusher plant on job site; paving concrete mixer; timber jack
 GROUP 2: Sonic or vibratory hammer; grader; scraper; tandem scraper; bulldozer; tractor; mechanic - maintenance; York rake; mulching machine; paving screed machine; stationary steam boiler; paving concrete finishing machine; grout

pump; portable steam boiler; portable steam generator; roller; spreader; asphalt paver; locomotives or machines used in place thereof; tamper (self propelled or tractor-draw); cal tracks; ballast regulator; rail anchor machine; switch tamper; tire truck

GROUP 3: Pumps (1-3 grouped); compressor; welding machines (1-3 grouped); generator; sighting plant; heaters (power driven, 1- 5); syphon-pulsometer; concrete mixer; valves controlling permanent plant air steam, conveyor, wellpoint system (operating)

GROUP 4: Assitant engineer (fireman)

GROUP 5: Oiler (other than truck cranes and gradalls)

GROUP 6: Oiler (on truck cranes and gradalls)

IRON0007-001 03/16/2022

AREA 1: BRISTOL (Easton); ESSEX (Beverly, Gloucester, Lynn, Lynnfield, Manchester, Marblehead, Nahant, Rockport, Salem, Saugus, Swampscott); MIDDLESEX (Arlington, Bedford, Belmont, Burlington, Cambridge, Carlisle, Concord, Dunstable, Everett, Framingham, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Natick, Newton, Reading, Sherborn, Somerville, Stoneham, Sudbury, Wakefield, Waltham, Watertown, Wayland, Weston, Winchester, Woburn); NORFOLK (Except Medway); PLYMOUTH (Abington, Bridgewater, Brocton, Duxbury, East Bridgewater, Halifax, Hanover, Hanson, Hingham, Hull, Kingston, Marshfield, Norwell, Pembroke, Plymouth, Plympton, Rockland, Scituate, West Bridgewater, Whitman); SUFFOLK

AREA 2: ESSEX (Amesbury, Andover, Boxford, Danvers, Essex, Georgetown, Hamilton, Haverhill, Ipswich, Lawrence, Merrimac, Methuen, Newbury, Newburyport, North Andover, Rowley, Salisbury, Topsfield, Wenham, West Newbury); MIDDLESEX (Action, Billerica, Chelmsford, Dracut, Groton, Groveland, Littleton, Lowell, Middleton, North Reading, Pepperell, Tewksbury, Tyngsboro, Westford, Wilmington)

	Rates	Fringes
IRONWORKER		
AREA 1.....	\$ 50.60	34.81
AREA 2.....	\$ 46.19	39.20

* IRON0007-010 03/16/2023

MIDDLESEX (Ashby, Ashland, Ayer, Boxboro, Holliston, Hopkinton, Hudson, Marlboro, Shirley, Stow, Townsend); NORFOLK (Medway)

	Rates	Fringes
IRONWORKER.....	\$ 52.42	39.95

IRON0037-002 09/16/2022

BARNSTABLE; BRISTOL (Acushnet, Attleboro, Berkley, Dartmouth, Dighton, Fairhaven, Fall River, Freetown, Mansfield, New Bedford, North Attleboro, Norton, Raynham, Rehoboth, Seekonk, Somerset, Swansea, Taunton, Westport); DUKES; NANTUCKET; NORFOLK (Billingham, Franklin, Plainville, Wrentham); PLYMOUTH (Lakeville, Marion, Mattapoisett, Middleboro, Rochester, Wareham)

	Rates	Fringes
IRONWORKER.....	\$ 39.01	31.58

LAB00022-006 12/01/2021

SUFFOLK COUNTY (Boston, Chelsea, Revere, Winthrop, Deer & Nut Islands); MIDDLESEX COUNTY (Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Medford, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn only); NORFOLK COUNTY (Brookline, Dedham, and Milton only)

	Rates	Fringes
Laborers:		
GROUP 1.....	\$ 41.18	27.52
GROUP 2.....	\$ 41.43	27.52
GROUP 3.....	\$ 41.93	27.52
GROUP 4.....	\$ 42.18	27.52
GROUP 5.....	\$ 24.50	27.52
GROUP 6.....	\$ 43.18	27.52

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; carpenter tenders; cement finisher tenders

GROUP 2: Asphalt raker; fence and guard rail erector; laser beam operator; mason tender; pipelayer; pneumatic drill operator; pneumatic tool operator; wagon drill operator

GROUP 3: Air track operator; block paver; rammer; curb setter

GROUP 4: Blaster; powderman

GROUP 5: Flagger

GROUP 6: Asbestos Abatement; Toxic and Hazardous Waste Laborers

LAB00022-012 12/01/2021

Counties of BARNSTABLE; BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH; MIDDLESEX (With the exception of Arlington, Belmont, Burlington, Cambridge, Everett, Malden, Melrose, Reading, Somerville, Stoneham, Wakefield, Winchester, Winthrop and Woburn); NORFOLK (With the exception of Brookline, Dedham, and Milton)

	Rates	Fringes
Laborers:		
GROUP 1.....	\$ 35.41	26.59
GROUP 2.....	\$ 35.66	26.59
GROUP 3.....	\$ 36.16	26.59
GROUP 4.....	\$ 36.41	26.59
GROUP 5.....	\$ 24.50	26.59
GROUP 6.....	\$ 37.41	26.59

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; carpenter tenders; cement finisher tenders

GROUP 2: Asphalt raker; fence and guard rail erector; laser beam operator; mason tender; pipelayer; pneumatic drill operator; pneumatic tool operator; wagon drillperator

GROUP 3: Air track operator; block paver; rammer; curb setter; hydraulic & similar self powere drills

GROUP 4: Blaster; powderman

GROUP 5: Flagger

GROUP 6: Asbestos Abatement; Toxic and Hazardous Waste Laborers

LAB00022-013 12/01/2021

	Rates	Fringes
Laborers:		
(FREE AIR OPERATION):		
SHIELD DRIVEN AND LINER		
PLATE IN FREE AIR)		
GROUP 1.....	\$ 45.48	28.02
GROUP 2.....	\$ 45.48	28.02
(OPEN AIR CASSONS,		
UNDERPINNING AND TEST		
BORING INDUSTRIES):		
TEST BORING & WELL DRILLING		
Driller.....	\$ 42.58	27.67
Laborer.....	\$ 41.18	27.67
(OPEN AIR CASSONS,		
UNDERPINNING AND TEST		
BORING INDUSTRIES):		
OPEN AIR CASSON,		
UNDERPINNING WORK & BORING		
CREW		
Bottom man.....	\$ 42.33	27.67
Laborers; Top man.....	\$ 41.18	27.67
(TUNNELS, CAISSON &		
CYLINDER WORK IN		
COMPRESSED AIR)		
GROUP 1.....	\$ 42.93	28.02
GROUP 2.....	\$ 53.41	28.02
GROUP 3.....	\$ 53.41	28.02
GROUP 4.....	\$ 53.41	28.02
GROUP 5.....	\$ 53.41	28.02
GROUP 6.....	\$ 55.41	28.02
CLEANING CONCRETE AND		
CAULKING TUNNEL (Both New		
& Existing)		
GROUP 1.....	\$ 45.48	28.02
GROUP 2.....	\$ 45.48	28.02
ROCK SHAFT, CONCRETE		
LINING OF SAME AND TUNNEL		
IN FREE AIR		
GROUP 1.....	\$ 42.93	28.02
GROUP 2.....	\$ 45.48	28.02

GROUP 3.....	\$ 45.48	28.02
GROUP 4.....	\$ 45.48	28.02
GROUP 5.....	\$ 47.48	28.02

LABORERS CLASSIFICATIONS for TUNNELS, CAISSON & CYLINDER WORK
IN COMPRESSED AIR

GROUP 1: Powder watchman; Top man on iron bolt; change house attendant

GROUP 2: Brakeman; trackman; groutman; tunnel laborer; outside lock tender; lock tender; guage tender

GROUP 3: Motorman, miner

GROUP 4: Blaster

GROUP 5: Mucking machine operator

GROUP 6: Hazardous Waste work within the ""HOT"" zone. (A premium of two dollars \$2.00 per hour over the basic wage rate.

LABORERS CLASSIFICATIONS for (FREE AIR OPERATION): SHIELD
DRIVEN AND LINER PLATE IN FREE AIR

GROUP 1: Miner; miner welder; conveyor operator; motorman; mucking machine operator; nozzle man; grout man-; pumps, shaft and tunnel steel and rodman; shield and erector arm operators, mole nipper, outside motorman, burner, TBM operator, safety miner; laborer topside; heading motormen; erecting operators; top signal men

GROUP 2: Brakeman; trackman

LABORERS CLASSIFICATIONS FOR CLEANING CONCRETE AND CAULKING
TUNNEL (Both New & Existing)

GROUP 1: Concrete workers; strippers and form movers (wood & steel), cement finisher

GROUP 2: Form erector (wood & steel and all accessories)

LABORERS CLASSIFICATIONS for ROCK SHAFT, CONCRETE LINING OF
SAME AND TUNNE IN FREE AIR

GROUP 1: Change house attendants

GROUP 2: Laborers, topside, bottom men (when heading is 50 ft. from shaft) and all other laborers

GROUP 3: Brakeman; trackman; tunnel laborers; shaft laborers

GROUP 4: Miner; cage tender; bellman

GROUP 5: Hazardous Waste work within the ""HOT"" zone. (A premium of two dollars \$2.00 per hour over the basic wage rate)

FOOTNOTE FOR LABORERS:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Patriot's Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veteran's Day, Thanksgiving Day, and Christmas Day

LAB01421-001 12/01/2021

WRECKING LABORERS:

	Rates	Fringes
Laborers: (Wrecking)		
Group 1.....	\$ 41.33	27.37
Group 2.....	\$ 42.08	27.37
Group 3.....	\$ 42.33	27.37
Group 4.....	\$ 37.33	27.37
Group 5.....	\$ 40.43	27.37
Group 6.....	\$ 41.33	27.37

- Group 1: Adzeman, Wrecking Laborer.
- Group 2: Burners, Jackhammers.
- Group 3: Small Backhoes, Loaders on tracks, Bobcat Type Loaders, Hydraulic ""Brock"" Type Hammer Operators, Concrete Cutting Saws.
- Group 4: Yardman (Salvage Yard Only).
- Group 5: Yardman, Burners, Sawyers.
- Group 6: Asbestos, Lead Paint, Toxic and Hazardous Waste.

PAIN0035-001 07/01/2019

BARNSTABLE BRISTOL; DUKES; ESSEX; NANTUCKET; PLYMOUTH
(Remainder of NORFOLK; MIDDLESEX AND SUFFOLK COUNTIES)

	Rates	Fringes
PAINTER		
NEW CONSTRUCTION:		
Bridge.....	\$ 50.36	30.25
Brush, Taper.....	\$ 39.86	30.25
Spray, Sandblast.....	\$ 41.26	30.25
REPAINT:		
Bridge.....	\$ 50.66	30.90
Brush, Taper.....	\$ 37.92	30.25
Spray, Sandblast.....	\$ 39.32	30.25

PAIN0035-015 07/01/2019

MIDDLESEX (Cambridge, Everett, Malden, Medford, Somerville)
SUFFOLK COUNTY (Boston, Chelsea) NORFOLK COUNTY (Brookline)

	Rates	Fringes
PAINTER		
NEW CONSTRUCTION:		
Brush, Taper.....	\$ 45.65	30.25
Spray, Sandblast.....	\$ 47.05	30.25
REPAINT:		
Bridge.....	\$ 50.66	30.90
Brush, Taper.....	\$ 43.71	30.25

Spray, Sandblast.....\$ 45.11 30.25

PLAS0534-001 01/01/2020

ESSEX; MIDDLESEX; NORFOLK AND SUFFOLK COUNTY

Rates Fringes

CEMENT MASON/CONCRETE FINISHER...\$ 43.00 37.66

PLUM0004-001 03/01/2023

MIDDLESEX (Ashby, Ayer-West of Greenville branch of Boston and
Maine Railroad, Ft. Devens, Groton, Shirley, Townsend)

Rates Fringes

Plumbers and Pipefitters.....\$ 51.50 28.07

PLUM0012-001 02/26/2023

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers,
Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill,
Ipswich, Lawrence,Manchester, Marblehead, Merrimac, Methuem,
Middleton, Newbury, Newburyport, North Andover, Peabody,
Rockport, Rowley, Salem, Salisbury, Topsfieild, Wenham, West
Newbury)

Rates Fringes

PLUMBER.....\$ 64.69 34.53

PLUM0012-003 02/26/2023

ESSEX (Ames, Andover, Beverly, Boxford, Byfield, Danvers,
Essex, Georgetown, Gloucester, Groveland, Hamilton, Haverhill,
Ipswich, Lawrence, Manchester, Marblehead, Merrimac, Methuen,
Middleton, Newbury, Newburyport, North Andover, Peabody,
Rockport, Rowley, Salem, Salisbury, Topsfield, Wenham, West
Newbury)

Rates Fringes

Plumber, Pipefitter,
Steamfitter.....\$ 64.69 34.53

PLUM0012-006 02/26/2023

ESSEX (Lynn, Lynnfield, Nahant, Saugus, and Swampscott);
MIDDLESEX (Acton, Arlington, Ashland, Ayer - except W. of
Greenville Branch of Boston & Maine RR, Bedford, Belmont,
Billerica, Boxboro, Burlington, Cambridge, Carlisle,
Chelmsford, Concord, Dracut, Dunstable, Everett, Framingham,
Hudson, Holliston, Hopkinton, Lexington, Lincoln, Littleton,
Lowell, Malden, Marlboro, Maynard, Medford, Melrose, Natick,
Newton, North Reading, Pepperell, Reading, Sherborn,
Somerville, Stoneham, Stow, Sudbury, Tewksbury, Tyngsboro,
Wakefield, Waltham, Watertown, Wayland, Westford, Wilmington,
Winchester, Woburn); NORFOLK (Bellingham, Braintree,
Brookline, Canton, Cohasset, Dedham, Dover, Foxboro, Franklin,
Medfield, Medway, Millis, Milton, Needham, Norfolk, Norwood,
Plainville, Quincy, Sharon, Walpole, Wellesley, Westwood,

Weymouth, Wrentham); PLYMOUTH (Hingham, Hull, Scituate);
SUFFOLK

	Rates	Fringes
PLUMBER.....	\$ 64.69	34.53

PLUM0051-005 09/01/2018		

BARNSTABLE; BRISTOL; DUKES; NANTUCKET; NORFOLK (Avon, Holbrook,
Randolph, Stoughton) PLYMOUTH(Remainder of County)

	Rates	Fringes
Plumbers and Pipefitters.....	\$ 42.04	29.91

PLUM0537-001 03/01/2022		

MIDDLESEX (Arlington, Cambridge, Everett, Malden, Medford,
Melrose, Reading, Wakefield, Winchester and Woburn); NORFOLK
(Bellingham, Braintree, Brookline, Canton Cashasset, Dedham,
Foxboro, Franklin, Millis, Milton, Sharon, Walpole, Westwood,
and Wrentham); PLYMOUTH (Hingham, Hull, Scituate); ESSEX (Ames,
Andover, Beverly, Boxford, Byfield, Danvers, Essex, Georgetown,
Gloucester, Groveland, Hamilton, Haverhill, Ipswich,
Lawrence, Lynn, Lynnfield, Manchester, Marblehead, Merrimac,
Methuen, Middleton, Nahant, Newbury, Newburyport, North
Andover, Peabody, Rockport, Rowley, Salem, Salisbury, Saugus,
Swampscott, Topsfield, Wenham, West Newbury)

	Rates	Fringes
PIPEFITTER.....	\$ 60.28	32.48

TEAM0379-001 08/01/2022		

	Rates	Fringes
Truck drivers:		
Group 1.....	\$ 34.98	31.36+a+b
Group 2.....	\$ 35.15	31.36+a+b
Group 3.....	\$ 35.22	31.36+a+b
Group 4.....	\$ 34.44	31.36+a+b
Group 5.....	\$ 35.44	31.36+a+b
Group 6.....	\$ 35.73	31.36+a+b
Group 7.....	\$ 36.02	31.36+a+b

POWER TRUCKS \$.25 DIFFERENTIAL BY AXLE
TUNNEL WORK (UNDERGROUND ONLY) \$.40 DIFFERENTIAL BY AXLE
HAZARDOUS MATERIALS (IN HOT ZONE ONLY) \$2.00 PREMIUM

TRUCK DRIVERS CLASSIFICATIONS

Group 1: Station wagons; panel trucks; and pickup trucks

Group 2: Two axle equipment; & forklift operator

Group 3: Three axle equipment and tireman

Group 4: Four and Five Axle equipment

Group 5: Specialized earth moving equipment under 35 tons other than conventional type trucks; low bed; vachual; mechanics, paving restoration equipment

Group 6: Specialized earth moving equipment over 35 tons

Group 7: Trailers for earth moving equipment (double hookup)

FOOTNOTES:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day

B. PAID VACATION: Employees with 4 months to 1 year of service receive 1/2 day's pay per month; 1 week vacation for 1 - 5 years of service; 2 weeks vacation for 5 - 10 years of service; and 3 weeks vacation for more than 10 years of service

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 <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can

be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has 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 DECISIO"

APPENDIX H

Price Adjustment for Certain Materials in Construction Projects MGL Chapter 30 Section 38a

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APPENDIX H

PRICE ADJUSTMENTS FOR CERTAIN MATERIALS IN CONSTRUCTION PROJECTS MGL CHAPTER 30, SECTION 38A

On November 20, 2013, the Massachusetts Legislature passed a bill (Chapter 150 of the Acts of 2013) requiring that water and sewer projects bid under MGL Chapter 30 Section 39M include price adjustment clauses for **fuel** (both diesel and gasoline), **liquid asphalt** and **portland cement** contained in cast in place concrete for all projects that are advertised for bid after January 1, 2014.

The inclusion of these clauses in the construction contract is the responsibility of the awarding authority, and as such, MassDEP does not dictate what language should be used in the contract. MassDEP will, however, review the contracts to verify that price adjustment clauses have been included.

Awarding Authorities may find value from researching the *price adjustment* information on the Massachusetts Department of Transportation (MassDOT) website at <https://www.mass.gov/massdot-contract-price-adjustments>

MassDOT requires the use of price adjustment clauses in all of its contracts, and since 2008 has been requiring cities and towns utilizing Chapter 90 road construction funds to also include price adjustment clauses. Because of this, many cities and towns may already have drafted appropriate price adjustment language. This language would be suitable for use in SRF funded contracts. The MassDOT website has extensive information on price adjustments and required contract language for MassDOT contracts.

Attached below is the new Chapter 30, Section 38A language and the contract language that MassDOT uses in its construction contracts. The MassDOT contract language is presented as a possible starting point for borrowers that have not drafted price adjustment clauses. The LGU should consult with their legal and contract staff as appropriate in developing the price adjustment clauses.

Chapter 150 of the Acts of 2013 **An Act Relative to Price Adjustment for Certain Materials in Construction Projects**

Whereas, the deferred operation of this act would tend to defeat its purpose, which is to establish forthwith certain price adjustments, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same as follows:

SECTION 1. Chapter 30 of the General Laws is hereby amended by inserting after section 38 the following section:-

Section 38A. Contracts for road and bridge projects awarded as a result of a proposal or invitation for bids under section 39M shall include a price adjustment clause for each of the following materials: fuel, both diesel and gasoline; asphalt; concrete; and steel. Contracts for water and sewer projects awarded as a result of a proposal or invitation for bids under said section 39M shall include a price adjustment clause for fuel, both diesel and gasoline; liquid asphalt; and

portland cement contained in cast-in-place concrete. A base price for each material shall be set by the awarding authority or agency and shall be included in the bid documents at the time the project is advertised. The awarding authority or agency shall also identify in the bid documents the price index to be used for each material. The price adjustment clause shall provide for a contract adjustment to be made on a monthly basis when the monthly cost change exceeds plus or minus 5 per cent.

SECTION 2. Section 1 shall apply to projects which are advertised for bid after January 1, 2014.

Approved, November 25, 2013.

MassDOT Price Adjustment Clauses

DOCUMENT 00811
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
ENGLISH UNITS
Revised: 02/02/2009

This provision applies to all projects using greater than 100 tons of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

The Price Adjustment will be based on the variance in price for the liquid asphalt component only from the Base Price to the Period Price. It shall not include transportation or other charges. This Price Adjustment will occur on a monthly basis.

Base Price

The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price detailed below.

Period Price

Please note that, starting December 15, 2008, two sets of period prices will be posted each month on the MassHighway website at <https://www.mass.gov/orgs/highway-division>. They will be labeled "New Asphalt Period Price Method" and "Old Asphalt Period Price Method".

New Asphalt Period Price Method

The "New Asphalt Period Price Method" is for contracts bid after December 15, 2008 and will show the Period Price of liquid asphalt for each monthly period as determined by MassHighway using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. MassHighway will post this Period Price on this website within two (2) business days following their receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted MassHighway the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor.

Old Asphalt Period Price Method

The "Old Asphalt Period Price Method" Period Price will be for contracts bid on or before December 15, 2008 and will contain liquid asphalt prices as determined by the old or previous method. These prices will continue to be posted on MassHighway's website until all contracts using the "Old Asphalt Period Price Method" Period Price have been closed.

New and Old Asphalt Period Price Methods

The paragraphs below apply to both the New and the Old Asphalt Period Price Methods. The Contract Price of the hot mix asphalt mixture will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of tons of hot mix asphalt mixtures placed during each monthly period times the liquid asphalt content percentage times the variance in price between Base Price and Period Price of liquid asphalt.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department approved extension of time.

***** END OF DOCUMENT *****

DOCUMENT 00812
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS
Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (<https://www.mass.gov/orgs/highway-division>) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	FUEL FACTORS	
	Diesel	Gasoline
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

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DOCUMENT 00814
SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES
January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website <http://www.enr.com> under **Construction Economics**. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01.

No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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APPENDIX I

American Iron and Steel Requirements

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APPENDIX I

BUILD AMERICA, BUY AMERICA ACT (BABA)

AMERICAN IRON AND STEEL (AIS)

ATTACHMENTS

1. **Information Checklist for Waiver Request**
2. **HQ Review Checklist for Waiver Request**
3. **Example Loan Agreement Language**
4. **Sample Construction Contract Language**
5. **Sample Certification 1**
Sample Certification 2

Appendix I

Build America, Buy America (BABA) Requirements



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

November 3, 2022

MEMORANDUM

SUBJECT: Build America, Buy America Act Implementation Procedures for EPA Office of Water Federal Financial Assistance Programs

FROM: RadhikaFox
Assistant Administrator

A handwritten signature in black ink, appearing to be "RadhikaFox".

TO: EPA Regional Water Division Directors, Regions I - X
EPA Office of Water Office Directors

OVERVIEW

The Biden-Harris Administration recognized the Nation's critical need for infrastructure investment, championing the Bipartisan Infrastructure Law (BIL), which Congress passed on November 15, 2021 (also known as the Infrastructure Investment and Jobs Act (IIJA)). The BIL will provide an unprecedented level of federal investment in water and wastewater infrastructure in communities across America.

In Title IX of the IIJA, Congress passed the Build America, Buy America (BABA) Act, which establishes strong and permanent domestic sourcing requirements across all Federal financial assistance programs for infrastructure. The U.S. Environmental Protection Agency (EPA) Office of Water is honored to help lead the implementation of these provisions and is proud of its near decade of successful implementation of the American Iron and Steel (AIS) provisions for its flagship water infrastructure programs.

This is a transformational opportunity to build a resilient supply chain and manufacturing base for critical products here in the United States that will spur investment in good-paying American manufacturing jobs and businesses. EPA's efforts to implement BABA will help cultivate the domestic manufacturing base for a wide range of products commonly used across the water sector but not currently made domestically. This will take time, and flexibility will be important to ensure that EPA can leverage critical water investments on time and on budget to protect public health and improve water quality.

IMPLEMENTATION

Recognizing the opportunity and need for BABA implementation guidance, the Made in America Office (MIAO) of the Office of Management and Budget (OMB) published [Initial Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure](#) (OMB Guidance M-22-11) on April 18, 2022. The guidance provides government-wide implementation direction for all Federal financial assistance programs for infrastructure. Despite the extensive guidance developed by MIAO, EPA's Office of Water infrastructure investment programs have received many questions that were not addressed in OMB Guidance M-22-11 or that require further clarification for EPA water infrastructure programs. The following questions and answers serve to supplement OMB Guidance M-22-11 with implementation procedures specific to EPA's relevant water infrastructure programs.

Section 70914(a) of the IIIA states when a Buy America preference under BABA applies: "Not later than... [May 14, 2022], the head of each Federal agency shall ensure that none of the funds made available for a Federal financial assistance program for infrastructure... may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States." Therefore, Federal financial infrastructure investments obligated on or after May 14, 2022, must comply with the BABA requirements. Absent a waiver, all iron, steel, manufactured products, and construction materials permanently incorporated into an infrastructure project subject to the BABA requirements must be produced in the United States. For many of EPA's Office of Water infrastructure investment programs, the vast majority of products permanently incorporated into construction, maintenance, or repair projects must comply with the BABA requirements, with the exception of select construction materials (cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives), which are specifically excepted by the BABA statute.

EPA's Office of Water implements many infrastructure investment programs subject to BABA requirements, including the following:

- Alaska Native Villages and Rural Communities Water Grant Program (ANV) (and any associated Interagency Agreements with the Indian Health Service)
- Clean Water and Drinking Water State Revolving Fund Programs (CW and DWSRF)
- Clean Water and Drinking Water Grants to U.S. Territories and the District of Columbia
- Clean Water Indian and Drinking Water Tribal Infrastructure Grant Set-aside (and any associated Interagency Agreements with the Indian Health Service)
- Coastal Wetlands Planning, Protection and Restoration Act, (CWPPRA) Programs
- Congressionally Directed Spending/Community Project Funding (also known as Community Grants)
- Geographic Programs¹
- Gulf Hypoxia Program
- National Estuaries Program (CWA Section 320)

¹ Geographic Programs include: Great Lakes Restoration Initiative, Chesapeake Bay, San Francisco Bay, Puget Sound, Long Island Sound, Gulf of Mexico, South Florida, Lake Champlain, Lake Pontchartrain, Southern New England Estuaries, Columbia River Basin, Pacific Northwest

- 319 Nonpoint Source Management Program Implementation
- Reducing Lead in Drinking Water Grant Program (SDWA §1459B)
- Assistance for Small and Disadvantaged Communities Grants: Small, Underserved, and Disadvantaged Community Grant Program (SUDC), Emerging Contaminants in Small or Disadvantaged Communities (EC-SDC) and Drinking Water Infrastructure Resilience & Sustainability (SDWA §1459A)
- Sewer Overflow and Stormwater Reuse Municipal Grants (OSG)
- USMCA Implementing Legislation (Section 821 and Title IX, USMCA Supplemental Appropriations, 2020)
- U.S.-Mexico Border Water Infrastructure Program
- Voluntary School and Child Care Program Lead Testing and Remediation Grant Program (SDWA 1464(d))
- Water Infrastructure Finance and Innovation Act (WIFIA)

The questions and answers in this document apply to the implementation of BABA requirements for the Office of Water infrastructure programs listed above unless superseded by regulation, statute, or other applicable guidance. For many of the programs listed above which did not have domestic preference requirements prior to BABA, additional implementation details are pending or may be developed after the issuance of these procedures. In addition, EPA notes that more direction will be helpful to inform the determination and definition of domestic content in manufactured goods. Supplemental guidance on these and other issues, from either OMB or EPA, may be forthcoming. These implementation procedures may also apply to additional, unlisted EPA programs which may be required to apply BABA subsequent to publication of this memorandum (e.g., future funding programs which have been authorized, but not yet appropriated).

For more information on the BABA requirements, visit the EPA Office of Water’s dedicated website – <https://www.epa.gov/cwsrf/build-america-buy-america-baba> – or contact your funding authority (such as your grants officer, portfolio manager, or state contact). For information on approved waivers, visit <https://www.epa.gov/cwsrf/build-america-buy-america-baba-approved-waivers>. You may also email questions to BABA-OW@epa.gov.

This Implementation Procedures document is organized to provide responses to questions in the following topic areas:

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QUESTIONS AND ANSWERS

SECTION 1: GENERAL

- Q1.1: Will EPA provide documentation for BABA for bid solicitations and suggested contract language? Will EPA provide suggested language for Assistance Agreements?
 - A1.1: See Appendix 1, which includes suggested language for construction contracts which addresses the BABA requirements. In addition to the language suggested in Appendix 1, EPA also recommends that assistance recipients prepare contract bid solicitation documents with a statement for the consulting engineers and construction firms as follows: “By signing payment application and recommending payment, Contractor certifies they have reviewed documentation for all products and materials submitted for payment, and the certifications are sufficient to demonstrate compliance with Build America, Buy America Act requirements.” In most cases, the assistance recipient’s representatives assume the responsibility for their clients to conduct due diligence on compliance with applicable domestic preference requirements.

All Federal Financial infrastructure assistance agreements subject to BABA must have a clause requiring compliance with the requirements. See Appendix 2 for example assistance agreement language.
- Q1.2: Would federally-financed infrastructure projects outside of the United States need to comply with the BABA requirements?
 - A1.2: No. According to the OMB Guidance (M-22-11), a “project” is defined as “...any activity related to the construction, alteration, maintenance, or repair of infrastructure in the United States.” Therefore, the BABA requirements are not implicated for infrastructure projects occurring outside of the United States, such as projects funded through the United States-Mexico-Canada Agreement with infrastructure activities occurring in Mexico or Canada (that is, outside the United States).
 -
- Q1.3: If most of the project is BABA compliant, and a small portion is not, can an assistance recipient self-fund (i.e., paying with non-federal dollars) the non-compliant products?
 - A1.3: Any project that is funded in whole or in part with federal assistance must comply with the BABA requirements, unless the requirements are otherwise waived. All iron, steel, manufactured products, and construction materials used in a project must meet the BABA requirements unless waived. Absent a waiver, there is no “small portion” or product that does not need to satisfy the BABA requirements unless the requirements are waived (or specifically excluded as is the case for cement and cementitious materials; aggregates such as stone, sand, or gravel; aggregate binding agents or additives; or non-permanent products). An assistance recipient may request a waiver or inquire as to whether a broad waiver, such as a *de minimis* waiver, might apply.

- Q1.4: How do international trade agreements affect the implementation of the BABA requirements?
 - A1.4: The BABA requirements apply in a manner consistent with United States obligations under international trade agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to these trade agreements. In general, assistance recipients are not signatories to such agreements, so these trade agreements have no impact on BABA implementation. In the few instances where such an agreement applies to a municipality, that municipality is responsible for determining its applicability and requirements and communicating with the funding authority (such as EPA and/or a state) on the actions taken to comply with BABA.

SECTION 2: PRODUCT COVERAGE

- Q2.1: For products made of iron and steel, what is the difference between predominantly and primarily iron and steel?
 - A2.1: EPA considers the terms “predominantly” and “primarily” to be interchangeable, such that a product is considered predominantly (or primarily) iron and steel if it contains greater than 50 percent iron and steel by material cost.
- Q2.2: What is the definition of construction materials (with examples)?
 - A2.2: From OMB Guidance M-22-11: “construction materials” include an article, material, or supply (other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; aggregate binding agents or additives; or non-permanent products) that is or consists primarily of:
 - non-ferrous metals,
 - plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables), (including optic glass),
 - lumber, and
 - drywall.

For example, a plate of glass would be a construction material under BABA, but a framed window that incorporates the glass into a frame would be a manufactured product. Another common construction material for water infrastructure projects would be polyvinyl chloride (PVC) pipe and fittings. However, if PVC components are incorporated into a more complex product such as instrumentation and control equipment or a water treatment unit, those items would be manufactured products.

- Q2.3: What are manufactured products (with examples)?
 - A2.3: From OMB Guidance M-22-11: “...all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total

cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation...”

The manufactured products category would cover the majority of potential water infrastructure products, including complex products made up of a variety of material types and components. For water infrastructure projects, common manufactured products would include, but not be limited to, pumps, motors, blowers, aerators, generators, instrumentation and control systems, gauges, meters, measurement equipment, treatment equipment, dewatering equipment, actuators, and many other mechanical and electrical items.

- Q2.4: Which category will valves fall under for BABA? Will it differ from the American Iron and Steel (AIS) requirements?
 - A2.4: For programs that are subject to BABA and AIS (SRF, WIFIA, and Community Project Funding), projects using valves should classify them as iron and steel products under BABA as long as their material cost is made up of more than 50 percent iron and/or steel. Valves with 50 percent or less iron and/or steel by material cost would be considered manufactured products under the BABA requirements.

In accordance with OMB Guidance M-22-11, an article, material, or supply should be classified into only one of the three categories: iron and steel, manufactured products, or construction materials. Under the AIS requirements, all valves made primarily of iron and steel (that is, those with iron and/or steel material cost greater than 50 percent) must comply with the AIS requirements. For BABA, EPA interprets Section IV of OMB Guidance M-22-11 to mean that iron and steel products are those items that are primarily iron and steel, the same as for the AIS requirements.

- Q2.5: Does EPA have a list of products to be classified as “Iron and Steel” under BABA?
 - A2.5: Although this list is not comprehensive, the following products were classified as AIS products if made primarily (more than 50 percent) of iron and/or steel by materials cost (for programs subject to both AIS and BABA, this list would be equivalent for “iron and steel” items or products under either requirement):

Products likely made “primarily” of iron and steel to be classified as <u>Iron and Steel</u> under BABA		
Lined and Unlined Pipe	Lined and Unlined Fittings	Tanks
Flanges	Pipe Clamps and Restraints	Structural Steel
Valves	Hydrants	Pre-Cast, Iron/Steel Reinforced Concrete (of all types, regardless of iron/steel content percentage)
Manhole Covers and other Municipal Castings	Access Hatches	Ballast Screens
Iron or Steel Benches	Bollards	Cast Bases
Cast Iron Hinged Hatches	Cast Iron Riser Rings	Catch Basin Inlets
Cleanout/Monument Boxes	Construction Covers and Frames	Curb and Corner Guards

Products likely made "primarily" of iron and steel to be classified as <u>Iron and Steel</u> under BABA		
Curb Boxes	Curb Openings	Curb Stops
Detectable Warning Plates	Downspout Shoes	Drainage Grates
Drainage Grate Frames and Curb Inlets	Inlets	Junction Boxes
Lampposts	Manhole Rings and Frames	Manhole Risers
Meter Boxes	Service Boxes	Steel Hinged Hatches
Steel Riser Rings	Trash Receptacles	Tree Grates
Tree Guards	Trench Grates	Valve Boxes
Valve Box Covers and Risers	Access Ramps	Aeration Pipes and Fittings (separate from aeration/blowers)
Angles	Backflow Preventers/Double Check Valves	Baffle Curtains
Iron or Steel Bar	Bathroom Stalls	Beam Clamps
Cable Hanging Systems	Clarifier Tanks	Coiled Steel
Column Piping	Concrete Reinforcing Bar, Wire, and Fibers	Condensate Sediment Traps
Corrugated Pipe	Couplings	Decking
Digester Covers	Dome Structures	Door Hardware
Doors	Ductwork	Expansion Joints
Expansion Tanks (diaphragm, surge, and hydropneumatics)	Fasteners	Fencing and Fence Tubing
Fire Escapes	Flanged Pipe	Flap Gates
Framing	Gate Valves	Generic Hanging Brackets
Grating	Ground Testing Boxes	Ground Test Wells
Guardrails	HVAC Registers, Diffusers, and Grilles	Joists
Knife Gates	Ladders	Lifting Hooks, J-bar, Connectors within, and Anchors for Concrete
Lockers	Man Baskets and Material Platforms	Manhole Steps
Mud Valves	Municipal Casting Junctions	Non-mechanical (aka stationary) Louvers and Dampers
Overhead Rolling Doors/ Uplifting Doors (manual open, no motor)	Pipe Connectors	Pipe Hangers
Pipe Piling (any type of steel piling)	Pipe Spool (pipe, flanges, connectors, etc.)	Pipe Supports
Pitless Adaptors	Pre-fab Steel Buildings/Sheds (simple structure, unfurnished)	Pre-stressed Concrete Cylinder Pipe (PCCP)
Railings	Reduced Pressure Zone (RPZ) Valves	Roofing
Service Saddles	Sheet Piling	Sinks (not part of eyewash systems)
Solenoid Valves	Stairs	Static Mixers
Stationary Screens	Surface Drains	Tapping Sleeves
Telescoping Valves	Tipping Buckets	Trusses
Tubing	Valve Stem Extensions	Valve Stems (excluding handwheels and actuators)
Wall Panels	Wall Sleeves/Floor Sleeves	Welding Rods
Well Casing	Well Screens	Wire
Wire Cloth	Wire Rod	Wire Rope and Cables

Q2.6: Does EPA have a list of products that could be made “primarily” of iron and steel but would be classified as “manufactured products” under BABA?

A2.6: Although this list is not comprehensive, the following products would be considered “manufactured products” under the BABA requirements, even if the item might be composed primarily of iron and steel by materials cost (Note: These items are not subject to the AIS requirements.):

Products likely made “primarily” of iron and steel to be classified as <u>Manufactured Products</u> under BABA		
Actuator Superstructures/ Support Structures	Aeration Nozzles and Injectors	Aerators
Analytical Instrumentation	Analyzers (e.g., ozone, oxygen)	Automated Water Fill Stations
Blowers/Aeration Equipment	Boilers, Boiler Systems	Chemical Feed Systems (e.g., polymer, coagulant, treatment chemicals)
Chemical Injection Quills	Chemical Injectors	Clarifier Mechanisms/Arms
Compressors	Controls and Switches	Conveyors
Cranes	Desiccant Air Dryer Tanks	Dewatering Equipment
Dewatering Roll-offs	Disinfection Systems	Drives (e.g., variable frequency drives)
Electric/Pneumatic/Manual Accessories Used to Operate Valves (such as electric valve actuators)	Electrical Cabinetry and Housings (such as electrical boxes/enclosures)	Electrical Conduit
Electrical Junction Boxes	Electronic Door Locks	Elevator Systems (hydraulic, etc..)
Emergency Life Systems (including eyewash stations, emergency safety showers, fire extinguishers, fire suppression systems including sprinklers/piping/valves, first aid, etc.)	Exhaust Fans	Fall Protection Anchor Points
Fiberglass Tank w/Appurtenances	Filters (and appurtenances, including underdrains, backwash systems)	Flocculators
Fluidized Bed Incinerators	Galvanized Anodes/Cathodic Protection	Gear Reducers
Generators	Geothermal Systems	Grinders
Heat Exchangers	HVAC (excluding ductwork)	HVAC Dampers (if appurtenances to aerators/blowers)
HVAC Louvers (mechanical)	Intake and Exhaust Grates (if appurtenances to aerators/blowers)	Instrumentation
Laboratory Equipment	Ladder Fall Prevention Systems	Ladder Safety Posts
Lighting Fixtures	Lightning and Grounding Rods	Mechanical or Actuated Louvers/Dampers
Membrane Bioreactor Systems	Membrane Filtration Systems	Metal Office Furniture (fixed)
Meters (including flow, wholesale, water, and service connection)	Motorized Doors (unit)	Motorized Mixers
Motorized Screens (such as traveling screens)	Motors	Pelton Wheels
Pipeline Flash Reactors (similar to injectors)	Plate Settlers	Precast Concrete without Iron/Steel Reinforcement

Products likely made "primarily" of iron and steel to be classified as <u>Manufactured Products</u> under BABA		
Furnished Pre-fab Buildings (such as furnished with pumps, mechanics inside)	Presses (including belt presses)	Pressure Gauges
Pump Cans/Barrels and Strainers	Pumps	Mechanical Rakes
Safety Climb Cable	Sampling Stations (unless also act as hydrant)	Scrubbers
Sensors	Sequencing Batch Reactors (SBR)	Steel Shelving (fixed)
Slide and Sluice Gates	Spray Header Units	Steel Cabinets (fixed interior/furniture)
Supervisory Control and Data Acquisition (SCADA) Systems	Tracer Wire	Valve Manual Gears, Actuators, Handles
Voltage Transformer	Water Electrostatic Precipitators (WESP)	Water Heaters
Weir Gates		

- Q2.7: Is asphalt paving a covered product under BABA?
 - A2.7: No. EPA interprets Section 70917(c) of the IIIA to exclude asphalt from BABA requirements. Asphalt paving is a type of concrete composed of an aggregate material mixed with a binder (bitumen). EPA considers asphalt concrete to be excluded by section 70917(c) due to its similarities with cement and cementitious materials.

SECTION 3: CO-FUNDING

- Q3.1: If projects are co-funded with funding mechanisms that don't require BABA, must the entire project comply with BABA?
 - A3.1: Yes. Any project that is funded in whole or in part with federal assistance must comply with the BABA requirements, unless the requirements are otherwise waived. 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 the contracts and assistance agreements awarded are closely related in purpose, time, and place. This precludes the intentional splitting of projects into separate and smaller contracts or assistance agreements to avoid BABA's applicability on some portions 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 agreements would carry separate requirements.

- Q3.2: How will project requirements be determined for co-funded projects subject to potentially different general applicability/programmatic waiver conditions (such as different adjustment period waivers)?
 - A3.2: OMB Guidance M-22-11 addresses cases with project co-funding from separate programs. EPA would apply the guidance's "cognizant" program determination to projects that are co-funded with different general applicability/programmatic waivers. For instance, if a project were co-funded between WIFIA and SRF and the majority of the Federal funding for the project is from WIFIA, then WIFIA would be the "cognizant" program for application and determination of waivers. In that case, any conditions from an applicable WIFIA waiver would apply.

SECTION 4: WAIVERS

- Q4.1: Who may apply for a waiver and how do you apply?
 - A4.1: Assistance recipients and their authorized representatives may apply for a project-specific waiver. EPA does not accept waiver requests from suppliers, distributors, or manufacturers unless the assistance recipient endorses and submits the request on its own behalf to the funding authority. In the case where multiple programs are providing federal funds to the project, the assistance recipient should submit the waiver request to the cognizant program, the one providing the greatest amount of federal funds for the project. For information on applying for cost waivers, see questions 4.4 and 4.5. For information on the SRF program roles and responsibilities, see question 7.6.

Project-specific waiver requests should generally include: (1) a brief summary of the project, (2) a description and explanation of the need for the waiver for the product(s) in question, (3) a brief summary of the due diligence conducted in search of domestic alternatives (which could include correspondence between assistance recipient and supplier/distributors), (4) the quantity and materials of the product(s) in question, (5) all engineering specifications and project design considerations relevant to the product(s) in question, (6) the approximate unit cost of items (both foreign and domestic) in addition to an estimated cost of the materials and overall project, (7) the date any products will be needed on site in order to avoid significant project schedule disruptions, and (8) any other pertinent information relevant to EPA's consideration of the waiver (e.g., if relevant for SRF projects: whether the project is designated as an equivalency project, the date the plans and specifications were submitted to the state, the date of construction initiation, expected date of project completion, any special considerations such as local zoning and building ordinances, seismic requirements, or noise or odor control requirements).

In the case of indirect federal assistance, such as the SRF programs, the state authority reviews and conveys the waiver request to EPA. States should submit waiver requests to the appropriate program waiver request inbox. For SRF projects, please use CWSRFWaiver@epa.gov or DWSRFWaiver@epa.gov.

- Q4.2: Can an assistance recipient request a waiver based on a specification written for a specific brand or model of product (that is, a specification that names a branded item or model)?
 - A4.2: In most cases, performance-based specifications are expected and required for the majority of infrastructure projects funded by EPA's financial assistance programs. In rare cases where "branded" or product-specific sourcing may be included in project specifications, it is suggested that the specifications include the item in question (that is, not simply a catalog page, but also materials of construction, sizing, quantities, and applicable engineering performance design characteristics for the project, etc.) in addition to the standard phrase "or equal." For the purposes of product alternative market research, EPA will evaluate the BABA requirements based on performance-based engineering specifications for the product(s) in question. If the project's specifications do not include performance-based specifications, or at least an "or equal" designation, EPA will base its research on an "or equal" designation using best professional judgment to the extent practicable.
- Q4.3: If a manufactured product is not readily available domestically, will EPA provide short-term "limited availability" product waivers?
 - A4.3: EPA will address the unavailability of domestic products through the waiver process, including potential national short-term waivers for specific products, if appropriate. To the extent practicable and with the intent to maximize domestic market and supply chain development, EPA intends to address issues of broad product unavailability with targeted, time-limited, and conditional waivers, as prescribed in OMB Guidance M-22-11. EPA will follow its robust and thorough product research processes (those put into place for the AIS requirements for the SRF and WIFIA programs and expanded for the new BABA requirements) to identify and determine those products for which proposed national/general applicability waivers may be appropriate.
- Q4.4: What information is needed when applying for a cost waiver under BABA?
 - A4.4: As part of the cost waiver request, the assistance recipient must demonstrate that implementation of the BABA requirements will increase the overall project cost more than 25 percent. Depending on the circumstances of the overall project cost increases, documentation to justify the cost waiver can vary but may include itemized cost estimates or bid tabulations comparing project costs with and without BABA implementation. Assistance recipients should begin assessing the potential cost impacts of the BABA requirements during the design phase of a project.
- Q4.5: Can administrative costs associated with tracking and verification of certifications be considered when determining if the cost of a project increases by 25 percent or more?
 - A4.5: Yes. Section 70914(b)(3) of the IIJA states that a waiver may be provided if the overall cost of the project increases by more than 25 percent due to the "inclusion of iron, steel, manufactured products, or construction materials produced in the United States." EPA interprets this to mean that the "inclusion" of the BABA-covered products could encompass

reasonable administrative costs associated with complying with the BABA requirements, such as staff, contractor, and technological resources to collect and track BABA compliance documentation.

- Q4.6: How can assistance recipients and construction contractors address product delivery delays?
 - A4.6: Assistance recipients should reasonably plan for material procurement to account for known potential supply chain issues or extended lead times and shall notify the funding authority well in advance of the issues so that prompt attention can be given to explore options. Where extended lead times for compliant products are impacting project schedules and may significantly impact construction progress, timely communication with the funding agency is important. For products that are unavailable within a reasonable timeframe to meet the objectives and schedule of a project, EPA may consider a non-availability waiver with adequate justification. An assistance recipient would need to apply for the waiver and contact its funding authority (such as EPA and/or a state) to initiate the waiver process.

SECTION 5: DOCUMENTING COMPLIANCE

- Q5.1: Who will be responsible for BABA enforcement?
 - A5.1: Responsibility for BABA implementation applies at all levels, from manufacturers to suppliers and distributors, construction contractors, assistance recipients, and funding authorities.

The manufacturers have responsibility to provide adequate and accurate documentation of the products manufactured. If suppliers and distributors are involved, they are responsible for passing along compliance documentation for products supplied to projects that are subject to the BABA requirements.

The assistance recipient and their representatives are primarily responsible for ensuring the documentation collected for products used on the project is sufficient to document compliance with the BABA requirements.

The funding authority is responsible for providing oversight and guidance as needed to ensure the proper implementation of the requirements. The Uniform Grants Guidance (UGG) (Title 2 of the Code of Federal Regulations (CFR) Part 200) applies to many Federal financial assistance agreements that will include BABA requirements. The general provisions of 2 CFR Part 200 determine the responsible party for the grant funding authority.

For information on SRF program roles and responsibilities, see question 7.6.

At all levels, where 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. More information can be found at this website: <http://www.epa.gov/oig/hotline.htm>.

- Q5.2: When will the BABA requirements be assessed for compliance? Do assistance recipients need to have waivers for potential non-domestic products before assistance agreements are in place, at the time products are procured or products are incorporated into the project (i.e., used)?
 - A5.2: Compliance is assessed where the domestic product is used (or installed) at the project site. Proper compliance documentation, whether it is a BABA certification letter or a waiver, should accompany a product prior to its “use”, in accordance with Section 70914(a) of IIJA. This may occur prior to assistance agreements being in place but is not necessary. Additionally, communication of BABA requirements through appropriate Terms and Conditions in financial assistance agreements and in project solicitation and contract documents is key in ensuring all parties involved are informed of the requirements for the project before construction is underway.

- Q5.3: How can product compliance with the BABA requirements be demonstrated?
 - A5.3: Assistance recipients and their representatives should ensure that the products delivered to the construction site are accompanied by proper documentation that demonstrate compliance with the law and be made available to the funding authority upon request. The documentation may be received and maintained in hard copy, electronically, or could be embedded in construction management software. The use of a signed certification letter for the project is the most direct and effective form of compliance documentation for ensuring products used on site are BABA-compliant prior to their installation; however, other forms of documentation are also acceptable as long as collectively, the following can be demonstrated:
 - (1) Documentation linked to the project. For example, this can be in the form of the project name, project location, contract number, or project number.
 - (2) Documentation linked to the product used on the project. For example, description of product(s) (simple explanation sufficient to identify the product(s)), or an attached (or electronic link to) purchase order, invoice, or bill of lading.
 - (3) Documentation includes statement attesting that the products supplied to the assistance recipient are compliant with BABA requirement. Reference to the Infrastructure Investment and Jobs Act (“IIJA”) or the Bipartisan Infrastructure Law (BIL) are also acceptable. For iron and steel items under BABA, references to the American Iron and Steel (AIS) requirements are also acceptable and reciprocal with BABA for such items.
 - (4) Documentation that manufacturing occurred in the United States, which could include, for example, the location(s) of manufacturing for each manufacturing step that is being certified. It is acceptable for manufactured products to note a single point of manufacturing, documenting that the final point of manufacturing is in the United States. Note that each BABA category may require different determinations for compliance.
 - (5) Signature of company representative (on company letterhead and signature can be electronic). The signatory of the certifying statement affirms their knowledge of the manufacturing processes for the referenced product(s) and attests that the product meets the BABA requirements.

In addition to compliance documentation, assistance recipients or their representatives should also conduct a visual inspection of the product when it arrives to the project site, especially for iron and steel products which are often stamped with the country of origin. (Note: A country of origin stamp alone is not sufficient verification of compliance with BABA and assistance receipts should not rely on it to ensure compliance.)

EPA may develop alternative procedures for demonstrating compliance. Additional project- or program-specific instructions may be developed on a case-by-case basis in order to meet individual circumstances.

- Q5.4: Will EPA provide a form or template for tracking and documenting compliance?
 - A5.4: EPA does not require a specified format for tracking or documenting compliance. Assistance recipients are free to develop any system (from simple to complex software) for tracking items used on the project and the accompanying compliance documentation, e.g., certification letters, applicable waivers, if it helps with implementation and compliance. Elements that may help with keeping track of compliance may include: product description, quantity required/used, product category (i.e., iron and steel, manufactured product, or construction material), status of obtaining certification letter, product cost, and whether the item might qualify as *de minimis*, or qualify under another applicable waiver.
- Q5.5: If a manufacturer claims to comply with the Buy American Act, does it also comply with BABA?
 - A5.5: No. With the exception of the AIS requirements – which EPA interprets to be equivalent to the “iron and steel” requirements under BABA – EPA does not have an interpretation about the comparability of other domestic preference requirements relative to BABA. Any products that are to be certified as compliant with BABA should include a specific reference to the BABA requirements and appropriate attestation from a responsible manufacturing company official. See Question 5.3 for EPA’s recommendations for BABA certification letters.
- Q5.6: How will assistance recipients manage certification letters for hundreds, possibly thousands of products?
 - A5.6: EPA recognizes that the new BABA requirements will cover most products used in typical water and wastewater infrastructure projects, and that the number of items which may require certification at large and/or complex projects may reach several hundred. EPA is concerned about the potential administrative burden that this would place on assistance recipients. EPA recommends that projects with a high number of potentially covered products meet with their funding authority about potential compliance strategies to minimize burden and streamline compliance activity. Assistance recipients should prepare contract bid solicitation documents with a statement for the consulting engineers and construction firms as follows: “By signing payment application and recommending payment, Contractor certifies they have reviewed documentation for all products and materials submitted for payment, and the documentation is sufficient to demonstrate compliance with Build America,

Buy America Act requirements.” In most cases, the assistance recipient’s representatives may assume the responsibility for their clients to conduct due diligence on compliance with applicable domestic preference requirements.

- Q5.7: Who is responsible for documenting the 55 percent content requirement for manufactured products under BABA? What if the final manufacturer cannot trace or verify domestic origin for all components?
 - A5.7: The manufacturer who signs a certification letter is responsible for documenting compliance with any of the three categories of products (iron and steel, manufactured products, or construction materials). For manufactured products, BABA requires that greater than 55 percent of the total cost of all components of the manufactured product be from domestic sources. EPA recommends that the certification letter for manufactured products document whether the item passes the content test in the final product along with a statement attesting to compliance with the BABA requirements for manufactured products.
- Q5.8: How do final product fabricators document compliance when the final step of manufacturing may be simply assembling components?
 - A5.8: It is acceptable, in many cases, especially for highly complex manufactured products that utilize many sub-components, for the final point of assembly to certify without using a “step certification” process. Multiple certifications (i.e., step certifications) or a singular certification can be used for a product, as long as the certifying official is willing to attest to the product’s compliance with BABA requirements at all stages of manufacturing.
- Q5.9: Will Material Test Reports be acceptable in lieu of a BABA certification for iron and steel?
 - A5.9: Material Test Reports (MTRs, commonly referred to as “Mill Certifications” or “Mill Certs”) provide the chemical composition of steel and iron from a mill or foundry. If an MTR accompanies the delivery of steel or iron to a project site with an invoice or bill of lading, EPA will consider it sufficient to demonstrate compliance (equivalent to a certification letter) as long as the MTR includes a manufacturer representative’s signature in addition to the location (city and state) of the mill/foundry. It is common for MTRs to be the first letter in a “step certification” if the product is further fabricated or painted, etc., by another manufacturer.
- Q5.10: Can a manufacturer use a fillable certification letter for products?
 - A5.10: EPA recommends that certifications be signed by representatives of the manufacturing entity. EPA does not oppose manufacturers using forms to internally develop letters within their company, thereby providing signed, non-manipulable certification letters to suppliers, distributors, and/or assistance recipients. A fillable form that can be changed by someone outside of the manufacturer after signature does not demonstrate compliance and may create compliance concerns for the manufacturer or assistance recipient.

- Q5.11: Are product certifications from suppliers and distributors allowed?
 - A5.11: EPA recommends that representatives of product manufacturers certify compliance and discourages suppliers and distributors from creating certification letters. EPA does not rule out the possibility that a third-party certification process, such as a certification by a distributor, may be viable. However, EPA is currently not aware of a system or proposed system that meets the EPA's recommendations for documentation of product certification.
- Q5.12: How long should assistance recipients keep compliance documentation?
 - A5.12: Assistance recipients should apply recordkeeping requirements for the project according to the procedures dictated by the funding authority. For most EPA grant programs, this is prescribed in the UGG at 2 CFR 200.334-200.338; e.g., the SRF programs require a minimum of three years. Other funding programs may require longer documentation retention periods.

SECTION 6: PROGRAMS WITH AMERICAN IRON AND STEEL REQUIREMENTS

- Q6.1: Does BABA supersede the American Iron and Steel (AIS) Requirements?
 - A6.1: The BABA requirements for items considered "iron and steel" are equivalent to those for covered iron and steel products under the AIS requirements in the Clean Water Act and the Safe Drinking Water Act. These requirements apply to the CWSRF, DWSRF, WIFIA, and Water Infrastructure Community Grants. BABA includes a "Savings Provision" (Section 70917(b)) that states that BABA does not affect existing domestic content procurement preferences for infrastructure projects funded by Federal financial assistance programs that meet the requirements of section 70914. EPA views the AIS requirements as meeting the "iron and steel" product requirements of BABA Section 70914, as they both include the key requirement that items made of iron and steel be wholly manufactured in the United States from the point of melting and/or pouring the iron or steel components through final manufacturing step. Because of the "Savings Provision" of Section 70917, the AIS requirements satisfy the "iron and steel" requirements of BABA. For the programs that have AIS requirements, EPA intends to implement BABA requirements the same way for iron and steel items as it has done for AIS products.
- Q6.2: For iron and steel products, does a manufacturer need to demonstrate compliance from initial melting through the finished product?
 - A6.2: For iron and steel products, the BABA requirements are the same as the existing AIS requirements, in that all of the iron and steel in a covered product (that is, the product is comprised of more than 50 percent iron and steel by material cost) must be melted and poured in the United States and all subsequent manufacturing processes (such as grinding, rolling, bending, reheating, and casting) must occur in the United States.

Q6.3: Will EPA apply the same manufacturing standards for BABA iron and steel products as for the American Iron and Steel (AIS) requirements?

- A6.3: Yes. For AIS, EPA did not require raw materials used in the production of steel or iron to be domestically sourced. For BABA, EPA interprets the requirements to be the same. Hence, like AIS, raw materials in the production of iron and steel subject to BABA requirements would not need to be domestically sourced. The key step for both AIS and BABA domestic iron and/or steel production is the melting/pouring (that is, the location of the furnace), which must be in the United States.

• Q6.4: Will the certification process be similar to the process established for the American Iron and Steel requirements?

- A6.4: EPA expects the certification process for the BABA requirements to be very similar to that established for the AIS requirements. For iron and steel products, the process should remain the same for AIS and BABA. EPA recommends for manufactured products and for construction materials that certification letters include direct reference to the product/material content requirements under BABA, in addition to an affirmative statement verifying that the product meets the BABA requirements.

• Q6.5: Will duplicate certification letters be required for AIS and BABA for iron/steel products?

- A6.5: No. Compliance with BABA requirements will be sufficient to demonstrate compliance with AIS requirements for iron and steel products. If a project is subject to BABA, the only demonstration of compliance necessary is with the BABA requirements, of which the iron and steel requirements are equivalent to those of the AIS statutory requirements: the iron or steel in a product made primarily or predominantly of iron and steel (comprising more than 50 percent iron and steel by material cost) must be melted and/or poured in the United States and all subsequent manufacturing processes must occur in the United States.

SECTION 7: PROGRAM-SPECIFIC ISSUES

• Q7.1.: How do the BABA requirements apply to Community Grants?

- A7.1: The Community Project Funding/Congressionally Directed Spending grants for the construction of drinking water, wastewater, and stormwater infrastructure and for water quality protection are subject to the requirements specified in the explanatory statement accompanying the Consolidated Appropriations Act (Explanatory Statement for Division G of P.L. 117-13, the Consolidated Appropriations Act of 2022). The explanatory statement asserts: "Applicable Federal requirements that would apply to a Clean Water State Revolving Fund or Drinking Water State Revolving Fund project grant recipient shall apply to a grantee receiving a CPF grant under this section." Therefore, the federally funded Community Project Funding/Congressionally Directed Spending grants are subject to the same requirements that apply to CWSRF or DWSRF projects, including BABA and AIS requirements. See also A1.2.

- Q7.2: Should SRF projects covered by the BABA SRF Projects Design Planning Adjustment Period Waiver follow the same procedures for demonstrating compliance as outlined for American Iron and Steel requirements?
 - A7.2: Yes. The SRF Design Planning Adjustment Period waiver does not waive the iron and steel requirements under BABA. The SRF programs have existing domestic preference requirements for SRF projects under CWA Section 608 and SDWA Section 1452(a)(4) (AIS requirements) to use iron and steel products that are produced in the United States. Sections 70917(a) and (b) of BIL explain the application of BABA to existing domestic preference requirements. Specifically, the savings provision in Section 70917(b) states that existing domestic preference requirements that meet BABA requirements are not affected by BABA. The statutory AIS requirements were existing at the time BABA became law and satisfy the BABA iron and steel requirements. Therefore, the statutory AIS requirements that have previously applied to SRF-funded projects will continue to do so, and compliance with AIS requirements will satisfy the BABA iron and steel requirements. Demonstration of compliance for iron and steel products will follow the AIS implementation policies for projects subject to the waiver.

- Q7.3: For SRF programs, is BABA considered a federal cross-cutting authority? (i.e., do “equivalency” rules apply?)
 - A7.3: Yes, BABA is considered a federal cross-cutting requirement that applies to SRF assistance equivalent to the federal capitalization grant (i.e., “equivalency” projects). EPA’s SRF regulations at 40 CFR 35.3145 and 35.3575 require states and recipients of SRF funds equivalent to the amount of the federal capitalization grant to comply with federal cross-cutting requirements. Section 70914 of the IIJA, which states when a Buy America preference applies, explains that “none of the funds made available for a Federal financial assistance program for infrastructure... may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States.” Therefore, BABA only applies to projects funded in an amount equivalent to the federal capitalization grant and not to those projects receiving funds in excess of the capitalization grant (i.e., “non-equivalency” projects). (Note: The AIS requirements continue to apply for all SRF projects, including non-equivalency projects, and all WIFIA and Community Grant projects, because equivalency does not apply.)

- Q7.4: Do the BABA requirements apply to Drinking Water State Revolving Fund set-asides?
 - A7.4: Due to requirements related to the deposit of funds in the DWSRF program, almost all of the funds used to conduct set-aside activities are Federal dollars. Therefore, Federal cross-cutting requirements must be applied to all set-aside activities. However, in the case of most set-aside activities, the cross-cutting requirements will not be implicated because of the nature of the activities conducted under the set-asides. Because the BABA requirements only apply to infrastructure, and infrastructure typically is not an eligible set-aside expenditure (with one potential exception being loans for incentive-based source water protection

measures under the Local Assistance and Other State Programs Set-Aside), the BABA requirements will not apply to most set-aside activities.

- Q7.5: What if an SRF project is refinanced using Federal financial assistance on or after May 14, 2022?
 - A7.5: If an SRF project began construction, financed from another funding source, prior to May 14, 2022, but is refinanced through an assistance agreement executed on or after that date, BABA requirements will apply to all construction that occurs on or after May 14, 2022, through completion of construction, unless a waiver applies. There is no retroactive application of the BABA requirements where a refinancing occurs for an SRF project that has completed construction prior to May 14, 2022. (Note: If SRF funding is used for the refinancing, the AIS requirements may still apply depending on the timing of construction.)
- Q7.6: What are the roles and responsibilities for SRF programs for BABA implementation?
 - A7.6: Implementation of the BABA requirements for the State Revolving Fund programs will continue the roles and responsibilities from the successful AIS implementation process.

As with AIS, it is both the assistance recipient's and the state's responsibility to ensure compliance with the BABA requirements. The state is the recipient of a federal capitalization grant and must comply with all grant conditions, including a condition requiring adherence to BABA requirements.

Consequently, states are strongly advised to conduct site visits of projects during construction and review documentation demonstrating the assistance recipient's proof of compliance. In EPA's experience, most states conduct periodic site visits and arrange timely meetings with funded projects. Observed best practices typically include a meeting early in the process (sometimes before bid and usually prior to commencing construction) and at least one project site visit during the construction process. Assistance recipients must maintain documentation of compliance with the BABA requirements, as explained in question 5.3. The documents must be kept by the assistance recipient and should be reviewed by the state during project reviews.

The state's role in the waiver process is to review any waiver requests submitted to the state to ensure that all necessary information has been provided by the assistance recipient prior to forwarding the request to EPA. If a state finds the request lacking, the state should work with the assistance recipient to help obtain complete information. Question 4.1 explains the information needed by EPA to expediently review a waiver request.

In order to implement the BABA requirements, EPA has developed an approach 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 BABA requirements directly to EPA Headquarters. Only waiver requests received and/or endorsed from states will be considered. Pursuant to BABA, EPA has the responsibility to make findings as to the issuance of waivers to the BABA requirements.

Step-by-step SRF Waiver Process

The waiver process begins with the assistance recipient. To fulfill the BABA requirements, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American-made iron and steel, manufactured goods, and construction materials. It is essential that the assistance recipient include the BABA terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 2 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 statutory conditions is demonstrated to EPA and approved.

To apply for a project-specific waiver, the assistance recipient should email the request in the form of a Word document (.doc) or editable PDF (.pdf) to the funding program. It is strongly recommended that each state identify a person or persons for BABA communications. The state designee(s) will review the application for the waiver and determine whether the necessary information has been included (Note: More information may be provided in the future regarding what information is required to be included in waiver requests). Once the waiver application is complete, the designee will forward the application to CWSRFWaiver@epa.gov or DWSRFWaiver@epa.gov.

Evaluation by EPA

After receiving an application for waiver of the BABA requirements and ensuring sufficient information was provided, EPA will publish the request on its website for 15 days and receive public comment. EPA will then determine whether the application properly and adequately documents and justifies the statutory basis cited for 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 whether a waiver request has been approved or not approved as soon as such a decision has been made. Granting such a waiver is a four-step process:

1. Research – After receiving an application for a waiver, EPA will perform market research to determine whether the iron, steel, manufactured goods, or construction materials are available domestically.
2. Posting – After research, if no domestic product has been identified, 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: <https://www.epa.gov/cwsrf/build-america-buy-america-baba-waivers-open-public-comment>.
3. Evaluation – After receiving an application for waiver of the BABA requirements, EPA will determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver 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 the Agency's website. The assistance recipient should keep a copy of the signed waiver in its project files.

(Note: Additional steps may be required in the future regarding the waiver process depending on additional guidance from OMB)

APPENDIX 1

Example Build America, Buy America (BABA) Act Construction Contract Language

ALL CONSTRUCTION CONTRACTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE BABA REQUIREMENTS. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN A PROJECT'S CONSTRUCTION CONTRACT. 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 _____ (“Owner”) and the _____ (the “Funding Authority”) that it understands the goods and services under this Agreement are being funded with federal monies and have statutory requirements commonly known as “Build America, Buy America,” that requires all of the iron and steel, manufactured products, and construction materials used in the project to be produced in the United States (“Build America, Buy America Requirements”) including iron and steel, manufactured products, and construction materials provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Owner and Funding Authority (a) the Contractor has reviewed and understands the Build America, Buy America Requirements, (b) all of the iron and steel, manufactured products, and construction materials used in the project will be and/or have been produced in the United States in a manner that complies with the Build America, Buy America Requirements, unless a waiver of the requirements 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 Build America, Buy America Requirements, as may be requested by the Owner or the Funding Authority. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Owner or Funding Authority to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Owner or Funding Authority resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the Funding Authority or any damages owed to the Funding Authority by the Owner). If the Contractor has no direct contractual privity with the Funding Authority, as a lender or awardee to the Owner for the funding of its project, the Owner and the Contractor agree that the Funding Authority 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 Funding Authority.

APPENDIX 2

Example Build America, Buy America (BABA) Act Assistance Agreement Language

ALL FEDERAL FINANCIAL INFRASTRUCTURE ASSISTANCE AGREEMENTS MUST HAVE A CLAUSE REQUIRING COMPLIANCE WITH THE BABA REQUIREMENTS. THIS IS AN EXAMPLE OF WHAT COULD BE INCLUDED IN AN ASSISTANCE AGREEMENT (E.G., SRF LOAN AGREEMENT). EPA MAKES NO CLAIMS REGARDING THE LEGAL SUFFICIENCY OF THIS CLAUSE WITH RESPECT TO STATE LAW:

Comply with all federal requirements applicable to the assistance received (including those imposed by the Infrastructure Investment and Jobs Act (“IIJA”), Public Law No. 117-58) which the Participant understands includes, but is not limited to, the following requirements: that all of the iron and steel, manufactured products, and construction materials used in the Project are to be produced in the United States (“Build America, Buy America Requirements”) unless (i) the Participant has requested and obtained a waiver from the cognizant Agency^[1] pertaining to the Project or the Project is otherwise covered by a general applicability waiver; or (ii) all of the contributing Agencies have otherwise advised the Participant in writing that the Build America, Buy America Requirements are not applicable to the Project.

Comply with all record keeping and reporting requirements under all applicable legal authorities, including any reports required by the funding authority (such as EPA and/or a state), 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 applicable legal requirements and this Agreement may result in a default hereunder that results in a repayment of the assistance agreement in advance of the maturity of the Bonds, termination and/or repayment of grants, cooperative agreements, direct assistance or other types of financial assistance, and/or other remedial actions.

^[1] From OMB Guidance M-22-11: To avoid a need for duplicative waiver requests from entities that receive funding for one infrastructure project through multiple Federal agencies, the Federal agency contributing the greatest amount of Federal funds for the project should be considered the “Cognizant Agency for Made in America” and should take responsibility for coordinating with the other Federal awarding agencies. Such coordination will provide uniform waiver criteria and adjudication processes, minimize duplicative efforts among Federal agencies, and reduce burdens on recipients. The Cognizant Agency for Made in America shall be responsible for consulting with the other Federal awarding agencies, publicizing the proposed joint waiver, and submitting the proposed joint waiver for review to MIAO.



APPENDIX I AMERICAN IRON AND STEEL (AIS) REQUIREMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

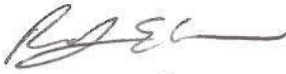
WASHINGTON, D.C. 20460

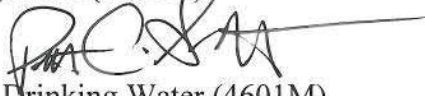
MAR 20 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76,
Consolidated Appropriations Act, 2014

FROM: *for* 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. More information can be found at this website: <https://oig.hhs.gov/fraud/report-fraud/>

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. For DWSRF waiver requests, please send the application to: 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
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 or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Attachments

Attachment 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"> • Waiver request includes the following information: <ul style="list-style-type: none"> — Description of the foreign and domestic construction materials — Unit of measure — Quantity — Price — Time of delivery or availability — Location of the construction project — Name and address of the proposed supplier — A detailed justification for the use of foreign construction materials • Waiver request was submitted according to the instructions in the memorandum • 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 		
<p>Cost Waiver Requests</p> <ul style="list-style-type: none"> • Waiver request includes the following information: <ul style="list-style-type: none"> — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — 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 		
<p>Availability Waiver Requests</p> <ul style="list-style-type: none"> • 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"> — Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials — 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. — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials • 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 • Has the State received other waiver requests for the materials described in this waiver request, for comparable projects? 		

Attachment 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
Cost Waiver Requests <ul style="list-style-type: none"> • Does the waiver request include the following information? <ul style="list-style-type: none"> — Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products — Relevant excerpts from the bid documents used by the contractors to complete the comparison — A sufficient number of bid documents or pricing information from domestic sources to constitute a reasonable survey of the market • Does the Total Domestic Project exceed the Total Foreign Project Cost by more than 25%? 				
Availability Waiver Requests <ul style="list-style-type: none"> • 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"> — Supplier information or other documentation indicating availability/delivery date for materials — Project schedule — Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of materials • 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? • 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) • 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"> — Multiple waiver requests for the materials described in this waiver request, for comparable projects in the same State — Multiple waiver requests for the materials described in this waiver request, for comparable projects in other States — Correspondence with construction trade associations indicating the non-availability of the materials • Are the available domestic materials indicated in the bid documents of inadequate quality compared those required by the project plans, specifications, and/or permits? 				

Attachment 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.

Attachment 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.

Attachment 5: Sample Certification 1

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

Date

Company Name

Company Address

City, State Zip

Subject: BABA and AIS 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.

BIL extends this procurement requirement to all construction projects going forward with the inclusion of the Build America, Buy America Act (BABA). Starting on May 14, 2022, all steel, iron, manufactured products, non-ferrous metals, plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables), glass (including optic glass), lumber, and drywall used in infrastructure projects for federal financial assistance programs must be produced in the United States.

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

Attachment 5: Sample Certification 2

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

Date

Company Name

Company Address

City, State Zip

Subject: BABA and AIS Certification for Project (XXXXXXXXXX)

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

BIL extends this procurement requirement to all construction projects going forward with the inclusion of the Build America, Buy America Act (BABA). Starting on May 14, 2022, all steel, iron, manufactured products, non-ferrous metals, plastic and polymer-based products (including polyvinyl chloride, composite building materials, and polymers used in fiber optic cables), glass (including optic glass), lumber, and drywall used in infrastructure projects for federal financial assistance programs must be produced in the United States.

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

APPENDIX J
Signage Requirements

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BUILDING A BETTER AMERICA

===== BUILD.GOV =====

THE BIPARTISAN INFRASTRUCTURE LAW

Project Funding Source Sign Assembly

BUILDING A BETTER AMERICA SIGNAGE GUIDELINES

Guidelines for Logo Applications

The purpose of this document is to provide general guidelines for signs displayed at project sites for projects funded under the Bipartisan Infrastructure Law, also known as the Infrastructure Investment and Jobs Act.

The first part of this document pertains to signs for projects funded under the Bipartisan Infrastructure Law that are not installed in the highway right-of-way. For highway signage guidance that is MUTCD compliant please see pages 10 and 11.

For all other signs please start here.

This document provides information about the Building A Better American logo mark as well as how logos, marks and seals of state, cities and counties can be incorporated into signage. Logos of contractors are not permitted on the signage. When logos are included in signage, the placement should conform to the brand guideline.




Variations and Usage

There is one approved mark associated with the Building A Better America logo. To preserve the integrity of the Building A Better America logo mark, make sure to apply them correctly. Altering, distorting, or recreating the ‘marks’ in any way weakens the power of the image and what it represents.

Layout and design of signs and communication materials will vary, so care must be taken when applying the logo mark.



The colors, graphics and fonts used should conform to graphic standards.

COLOR	CMYK	RGB	HEX P	MS
 Blue	83,48,0,48	22 / 68 / 132	#164484	PMS7687C
 Red	0,100,81,0	255/0/49	#FF0031	PMS185C
 White	2,2,0, 3	242 /244/248	#F2F4F8	Bright White

Logos

PROJECT FUNDED BY

The Bipartisan Infrastructure Law

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The Bipartisan Infrastructure Law



**U.S. Department
of Transportation**

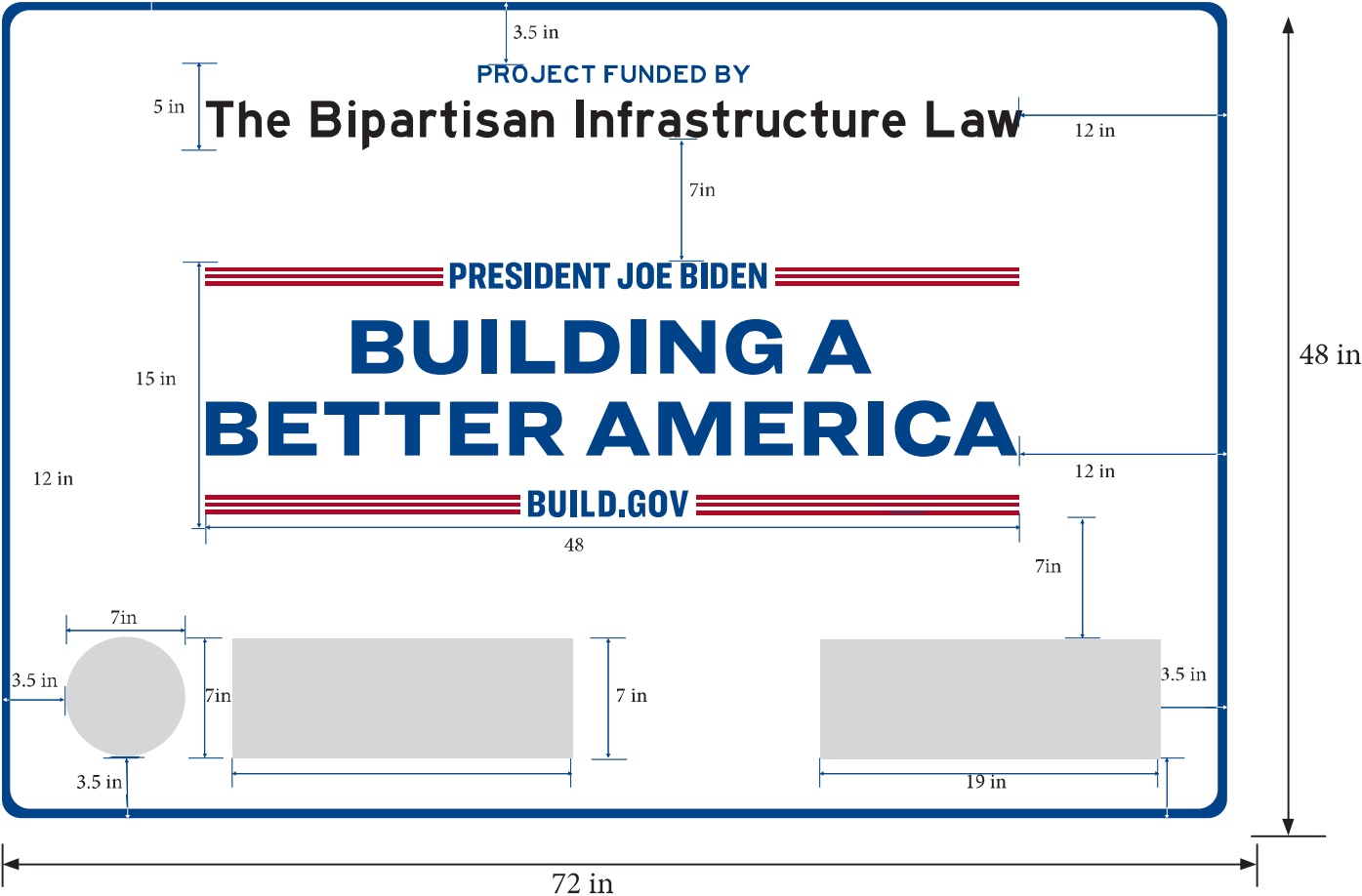
FTA



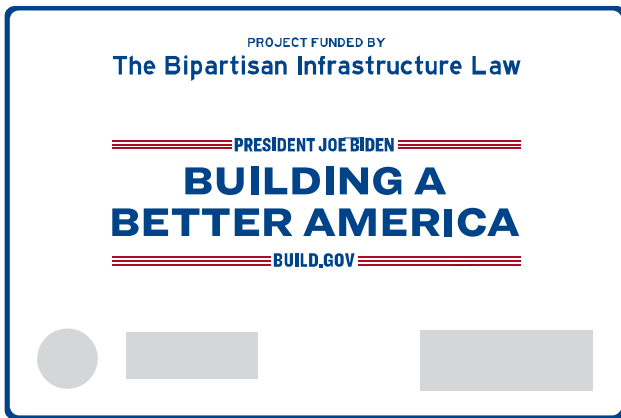
**U.S. Department
of Transportation**

FTA

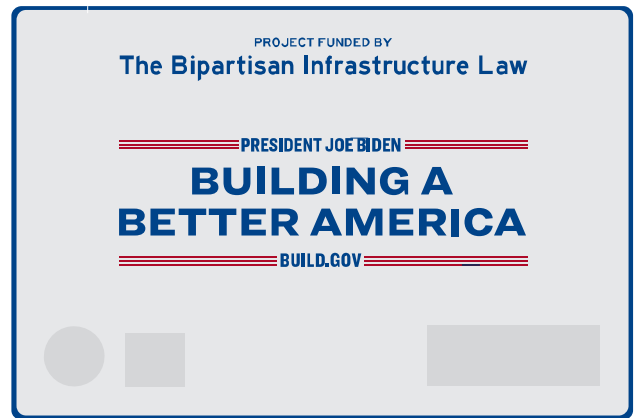
Building A Better America General Guidelines for Logo Applications



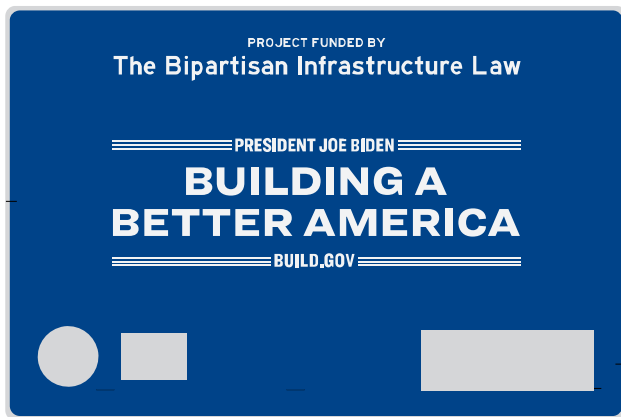
Sign Colors



White

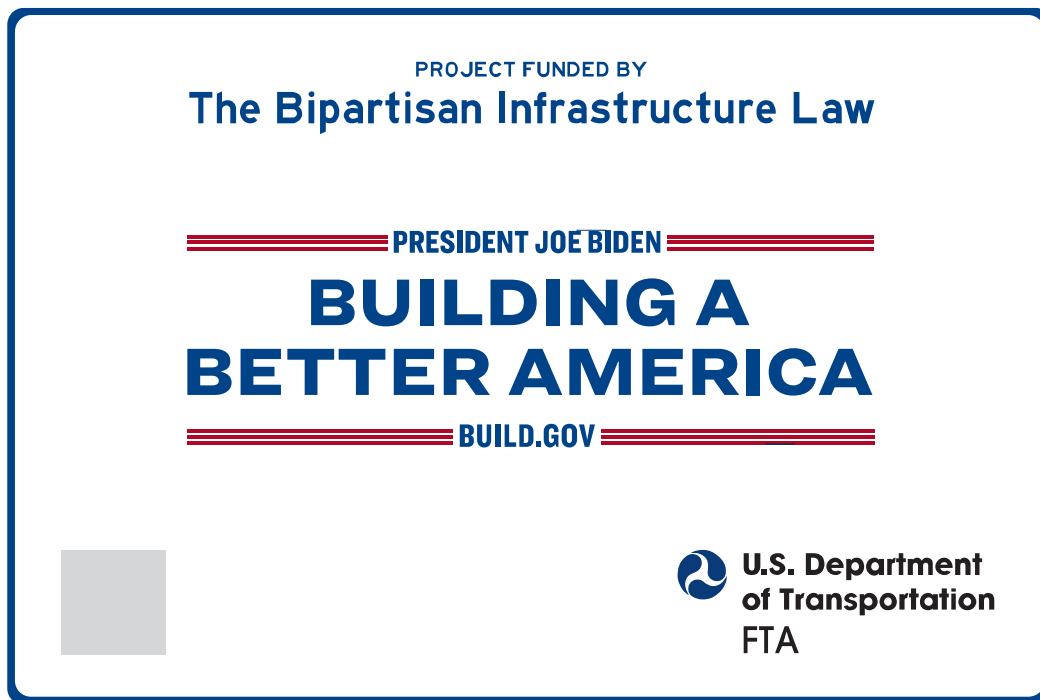


Gray

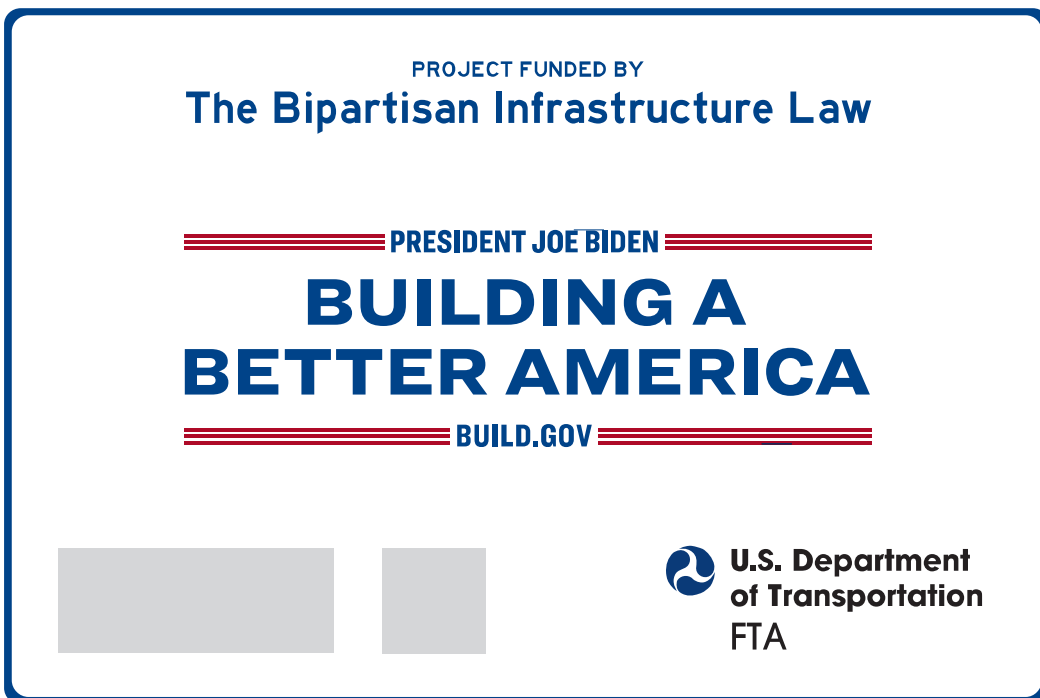


Blue

State, City and County Logo Variations



Square State Logo: 7X7 inches



Rectangle State Logo: not to exceed 19 x 7 inches

3 Logos Samples




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County/City Logo State Logo






City Circle Logo 7 X 7 Inches. State Rectangle Logo should not exceed 19x7 inches

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Rectangle State Logo: not to exceed 19 x 7 inches



2 Logos Samples

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Circle State Logo: 7 x 7 inches

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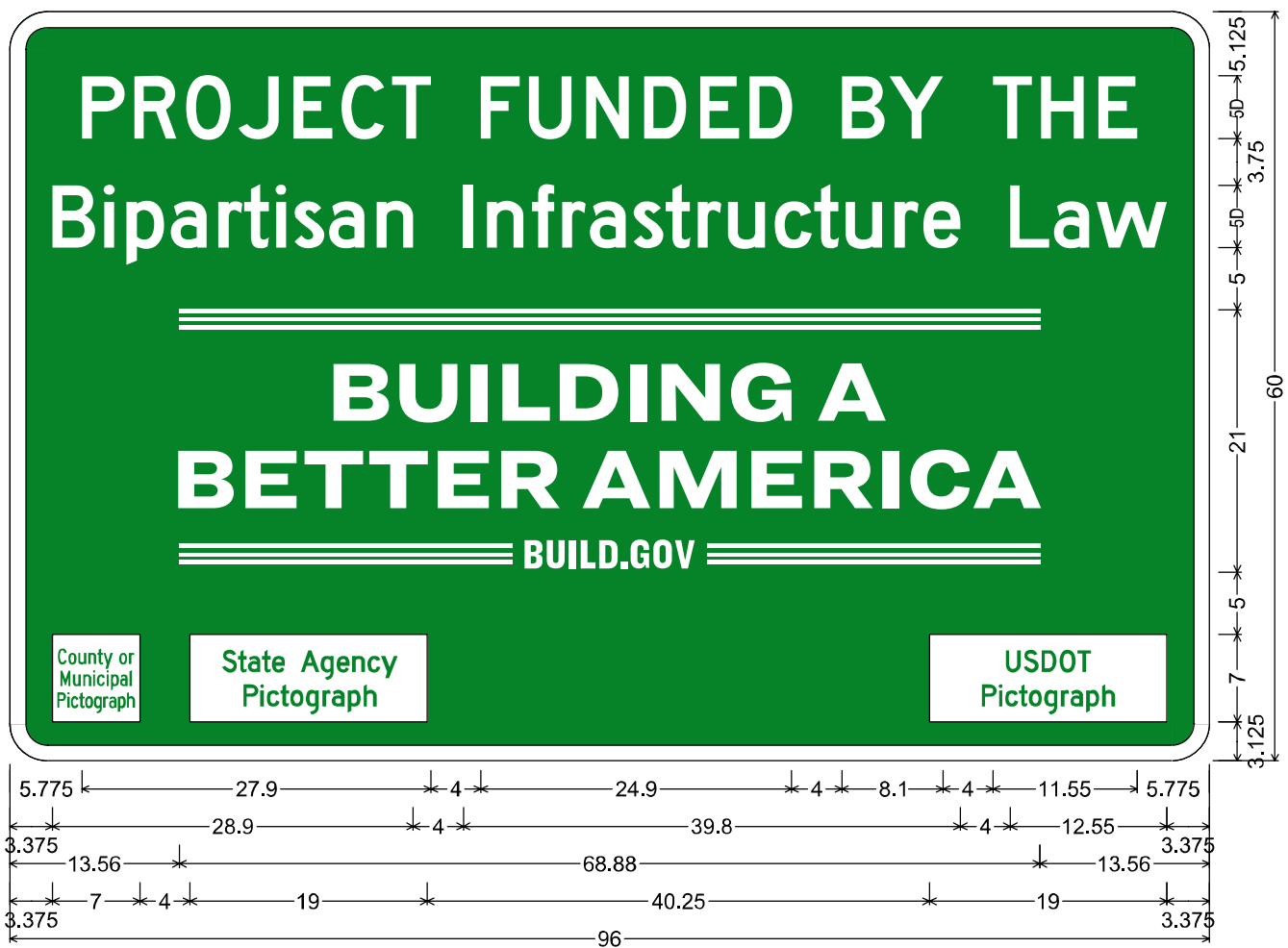
BUILD.GOV



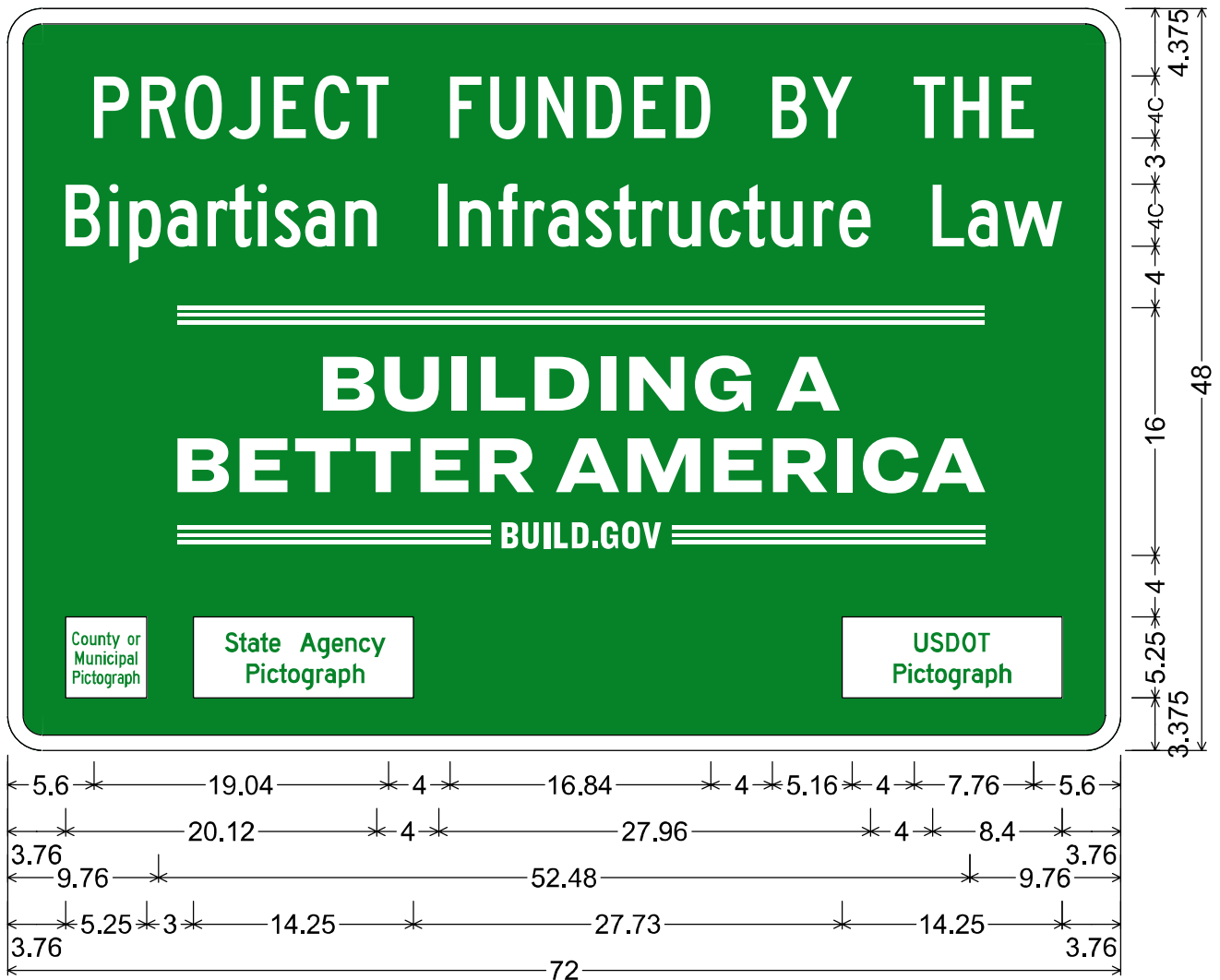
Circle State Logo: 7 x 7 inches

RULES FOR HIGHWAY RIGHT OF WAY SIGNAGE

Highway Right of Way Signage 8 Feet



Highway Right of Way Signage 6 Feet



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SECTION 01069

HEALTH & SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for providing a Health and Safety Plan (HASP) and maintenance of health and safety while performing the Work.

1.02 REQUIREMENTS

- A. Monitor working conditions at all times during construction and provide appropriate protective clothing, equipment and facilities for personnel, and establish workplace procedures to ensure personnel safety.
- B. Implement a Health and Safety protection program. The procedures for such implementation shall be submitted to the Engineer and Owner for approval. The procedures shall include provisions for stations allowing workers to wash and to put on and remove protective clothing, and stations for vehicles to be cleaned, if necessary, before leaving the site, air monitoring, and evaluation of areas where unsafe levels of gas has accumulated.
- C. Comply with all Federal, State, and local safety requirements related to the hazards anticipated to be encountered during the course of this project.
- D. In addition to the above requirements, comply with the following:
 - 1. All construction equipment on the site shall be equipped with vertical exhaust pipes or a spark proof exhaust.
 - 2. Smoking shall not be permitted in any area where gases can accumulate, or in areas where contaminated soil is present.
 - 3. Welding or open flames shall not be permitted in enclosed areas.
 - 4. Toxic gas indicators, an organic vapor analyzer, a combustible gas indicator, an oxygen indicator, and fire extinguishers shall be available at all times during operations. Periodic monitoring with portable monitoring devices shall be employed as dictated by the Health and Safety Plan.
 - 5. During operations, whenever unsafe levels of toxic gases are detected, all work will cease in that area until acceptable levels are reached.

1.03 SHOP DRAWINGS

- A. Submit site specific Health and Safety Plan (HASP) that complies with all applicable OSHA requirements to the Engineer for review and acceptance within fifteen (15) working days of the Contractor's Notice to Proceed. Certified Industrial Hygienist must certify the Contractor's plan prior to submittal to and review by the Engineer. The Contractor is not to proceed with any subsurface or site work without review and acceptance of the submitted Health and Safety Plan by the Engineer.

1.04 QUALITY ASSURANCE

- A. Engage an independent, qualified Health and Safety expert having experience in similar construction conditions, to monitor site conditions and recommend all necessary Health and

Safety protection. This person shall be a Certified Industrial Hygienist (CIH). The Contractor shall follow such recommendations and shall provide such protection to his personnel, and personnel of the Owner and Engineer, as may be affected.

1.05 REGULATORY REQUIREMENTS

- A. Establish work place procedures, enforce the use of these procedures, and the associated equipment and facilities in accordance with the following guidelines:
 - 1. Safety and Health Regulations Promulgated by the U.S. Department of Labor OSHA, 29 CFR 1910 - Occupational Safety and Health Standards, and 29 CFR 1920 - Safety and Health Regulations for Construction.
 - 2. Occupational Safety and Health Standards, 29 CFR 1926 - Safety and Health Regulations for Construction.
 - 3. U.S. Environmental Protection Agency Medical Monitoring Program Guidelines.

1.06 SITE CONDITIONS

- A. The Contractor's attention is directed to the fact that the work includes connecting new pipe lines to the existing sewer system. In addition to confined space issues, hazardous gasses and oxygen depletion may be encountered in the existing sewer system where proposed work is to take place.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PROTECTION

- A. If, at any time, the Owner or the Engineer is apprised of a safety hazard which demands immediate attention because of its high potential for harm to the public travel, persons on or about the Work, or public or private property, the Owner or the Engineer shall have the right to order such safeguards to be erected and such precautions to be taken as necessary and the Contractor shall comply with such orders. If, under such circumstances, the Contractor does not or cannot immediately put the Work into proper and approved condition, or if the Contractor or his representative is not upon the site so that he can be notified immediately of the insufficiency of safety precautions, then the Owner may put the Work into such a condition that is, in his opinion, in all respects safe, and the Contractor shall pay all expenses of such labor and materials as may have been used for this purpose by him or by the Owner. The fact that the Owner or the Engineer does not observe a safety hazard or does not order the Contractor to take remedial measures shall in no way relieve the Contractor of the entire responsibility for any costs, loss or damage by any party sustained on account of the insufficiency of the safety precautions taken by him or by the Owner acting under authority of this Section.
- B. If the Contractor is alerted to the fact that conditions of high hazard are present or can be present at the site during the performance of the Work, it is the responsibility of the Contractor to take appropriate safety precautions to meet whatever conditions of hazard may be present during the performance of the Work, whether reasonably foreseeable or not. The

safety conditions enumerated in the Specifications are the minimum permissible and neither the Owner nor the Engineer makes any representation that the safety standards provided herein will be adequate to meet all eventualities. The Contractor is therefore alerted to the fact that it shall be his responsibility to anticipate and provide such additional safety precautions, facilities, personnel and equipment as shall be necessary to protect life and property from whatsoever conditions of hazard are present or may be present.

- C. The Contractor shall supply and erect highly visible safety fencing a minimum of three feet in height around all construction areas that pose a threat to safety and post proper signage as required by Local, State and Federal requirements. The Contractor shall erect safety fencing as documented in the Contract Drawings or as directed by the Engineer and shall maintain such fencing and signage until such a time that the potential safety hazard has been rectified. Upon final completion of construction all safety fencing shall be removed off-site by the Contractor. Safety fencing requirements of OSHA shall be enforced by the Contractor.

END OF SECTION

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SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reference material, abbreviations, and terms used in the Construction Documents and establishes edition dates and complete titles for standards referenced elsewhere in the Specifications.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Obtain copies of standards when required by Contract Documents.
- C. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.03 SCHEDULE OF REFERENCES

AA	Aluminum Association 1400 Crystal Dr. Suite 430 Arlington, VA 22202
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439
AFBMA	Anti-Friction Bearing Manufacturers Association 2025 M. Street, NW Washington, DC 20036-3309
AGC	Associated General Contractors of America 2300 Wilson Blvd. Arlington, VA 22201

AGM	American Gear Manufacturers Association 1001 N. Fairfax Street Alexandria, VA 22314-1587
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480
AISC	American Institute of Steel Construction One East Wacker Drive Chicago, IL 60601-1802
AISI	American Iron and Steel Institute 25 Massachusetts Drive Washington, DC 20001
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANS	American National Standard
ANSI	American National Standards Institute 1899 L Street, NW, 11 th Floor Washington, DC 20036
API	American Petroleum Institute 1220 L Street, NW Washington, DC 20005
ARI	Air-Conditioning and Refrigeration Institute 2111 Wilson Boulevard Arlington, VA 22201
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers Two Park Avenue New York, NY 10016-5990
ASPA	American Sod Producers Association 1855 A Hicks Road Rolling Meadows, IL 60008

ASTM	American Society for Testing and Materials 100 Bar Harbor Drive PO Box C700 West Conshohocken, PA 19428-2959
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association 100 Chase Park South Birmingham, AL 35244-1851
AWS	American Welding Society
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 1850 Centennial Park Drive Reston, VA 20191
CS	Commercial Standard
EJCDC	Engineers' Joint Contract Document Committee American Consulting Engineers Council 1015 15 th Street, N.W. Washington, DC 20005
FM	Factory Mutual System 1151 Boston-Providence Turnpike PO Box 688 Norwood, Massachusetts 02062
Fed Spec.	Federal Specification General Services Administration Specification and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
HMA	Hot Mix Asphalt
IBR	Institute of Boiler and Radiator Manufacturers
ICBO	International Conference of Building Officials 900 Montclair Road Birmingham, AL 35213-2298
IPS	Iron Pipe Size
JIC	Joint Industry Conference Standards

MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
NASSCO	National Association of Sewer Service Companies 2470 Longstone Lane Marriottsville, MD 21104
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171
NCPWB	National Certified Pipe Welding Bureau
NEMA	National Electrical Manufacturers' Association 1300 North 17 th Street Arlington, VA 22209
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
NPT	National Pipe Thread
OS&Y	Outside screw and yoke
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
SMACNA	Sheet Metal and Air Conditioning Contractors' National Assoc. 4201 Lafayette Center Drive Chantilly, VA 20151-1219
Stl. WG	U.S. Steel Wire Washburn and Moen, American Steel and Wire or Roebling Gage
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
USS Gage	United States Standard Gage
125-lb. ANS 250-lb. ANS	American National Standard for Cast-Iron Pipe Flanges and Flange Fittings, Designation B16.1-1975, for the appropriate class

1.04 EDITION DATES

- A. Reference to publications and reference material shall be understood to mean the latest edition, unless stated otherwise.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

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SECTION 01170

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for environmental protection during and as the result of construction operations under this Contract except for those measures set forth in other provisions of these Specifications.
2. Environmental protection requires consideration of air, water and land, noise, solid waste management, vector and fire control.

B. Related Sections

1. Section 01300 - Submittals
2. Section 02080 – Excavation and Management of Contaminated Soil

1.02 QUALITY ASSURANCE

A. Requirements of regulatory agencies:

1. In order to prevent environmental pollution and to provide for environmental protection arising from 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 environmental protection, as well as the specific requirements stated in the Section and elsewhere in the Specifications.

1.03 SUBMITTALS

A. Under the requirements of Section 01300 - Submit the following.

B. Implementation Plan

1. Prior to commencement of the work, the Contractor shall:
 - a. Submit in writing his plans for implementing this Section for environmental protection.
 - b. Meet with the Engineer to develop mutual understandings relative to compliance with the provisions of this Section and administration of the environmental protection program.

C. Temporary Excavation and Embankments

1. If the Contractor proposes to construct temporary roads or embankments and excavations for work areas, he shall submit the following for approval prior to scheduled start of such temporary work:
 - a. A layout of all temporary roads, excavations and embankments to be constructed within the work area.
 - b. Plans and cross-sections of proposed embankments and their foundations, including a description of proposed materials.
 - c. A landscaping plan showing the proposed restoration of the area. Removal of any necessary trees and shrubs outside the limits of existing cleared areas shall

be indicated. The plan shall provide for the obliteration of construction scars and shall provide for a reasonably natural appearing final condition of the area. Modification of the Contractor's plans shall be made only with the written approval of the Engineer. No unauthorized road construction, excavation or embankment construction, including disposal areas will be permitted.

D. Erosion Sedimentation Plan

1. The Contractor shall submit to the Engineer, a detailed erosion and sedimentation plan for approval at least 10 days prior to initiation of work. The plan shall include location and construction details of the Contractor's proposed dikes, basins, etc. The Contractor shall provide and submit his control measures for stockpile material.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials shall be as specified elsewhere in this Specification.

PART 3 EXECUTION

3.01 PROTECTION OF LAND RESOURCES

- A. It is intended that the land resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their present condition, or be restored to a condition after completion of construction, that will appear to be natural and not detract from the appearance of the project. The Contractor shall confine his construction activities to areas defined on the Drawings or in the Specifications except with written approval of the property owners and the Engineer.
- B. Limits of working areas include areas for storage of construction material, and shall be cleared in a manner which will enable satisfactory restoration and which will not affect the environment during or after the construction period. The Contractor shall not enter beyond the working limits of the working area except with written approval of the Engineer and Owner.
- C. The location of areas for storage of the Contractor's materials required temporarily in the performance of the work, shall be within the limits of the working area and shall require written approval of the Engineer prior to use. The preservation of the landscape shall be an imperative consideration in the selection of all such sites. Where temporary structures are constructed on sidehills, the Engineer may require cribbing to be used to obtain level foundation. Benching or leveling of earth may not be allowed, depending on the location of the proposed facility.
- D. The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which permit the growth of vegetation thereon. The disturbed areas shall be graded and filled as

required, and topsoil shall be spread to a depth of approximately 6 inches over the entire area and the entire area shall be seeded.

3.02 PROTECTION OF WATER RESOURCES

- A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumen's, calcium chloride, acids or harmful materials. It is the responsibility of the Contractor to investigate and comply with all applicable Federal, State, County, and Municipal laws concerning pollution of rivers, streams and impounded water. All work under this Contract shall be performed in such a manner that objectionable conditions will not be created in streams through, or bodies of water adjacent to, the project area.
- B. Surface drainage from cuts and fills within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity producing materials are present, be held in suitable sedimentation basins or shall be graded to control erosion within acceptable limits. Temporary erosion and sediment control measures such as berms, dikes, drains, or sedimentation basins, if required to meet the above standards, shall be provided and maintained until permanent drainage and erosion control facilities are completed and operative. The area of bare soil exposed at any one time by construction operations should be held to a minimum.
- C. Apply temporary mulch on denuded ground immediately after rough grading is completed. This shall apply to all areas not subject to appreciable traffic during construction, even those that are to receive some form of construction later if ground is to be exposed 30 days or more.
- D. Stream and drainage ditch crossings by fording with equipment shall be limited to control turbidity, and in areas of frequent crossings, temporary culverts or bridge structures shall be installed. Any temporary culverts or bridge structures shall be removed upon completion of the project. Fills and waste areas shall be constructed by selective placement to eliminate silts or clays on the surface that will erode and contaminate adjacent streams.
- E. At all times of the year, special measures shall be taken to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides and insecticides, and cement and surface drainage from entering public waters.
- F. Disposal of any materials, wastes, effluents, trash, garbage, oil, grease, chemicals, etc., in areas adjacent to streams or other waterways shall be disposed of by the Contractor in accordance with the applicable governing regulations. If any waste material is dumped in unauthorized area, the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed of as specified hereinbefore, and replaced with suitable fill material, compacted and finished with topsoil, all at the expense of the Contractor.

3.03 MAINTENANCE

- A. The Contractor shall dispose of all discarded debris and aggregate samples in a manner approved by the Engineer. Toilet facilities shall be kept clean and sanitary at all times. Services shall be performed at such a time and in such a manner to least interfere with the operations. Services shall be accomplished to the satisfaction of the Engineer.

- B. The Contractor shall frequently remove materials no longer required on the site so that, at all times, the site, access routes to the site and any other areas disturbed by his operations shall present a neat, orderly, workmanlike appearance.
- C. Before semi-final payment, the Contractor shall remove all surplus material, plant of any description, and debris of every nature resulting from his operations, and put the site in a neat, orderly condition; and restore all areas which have been used for storage of materials and equipment, and all areas which have been disturbed by his operations, to their original condition or to a condition satisfactory to and approved by the Engineer.

3.04 DUST CONTROL

- A. The Contractor shall maintain all excavations, embankments, stockpiles, haul roads, permanent access roads, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust which would cause a hazard or nuisance to others or contaminate surface water.

3.05 NOISE CONTROL

- A. The Contractor shall use every effort and means possible to minimize or eliminate noise caused by his operation which the Engineer may consider objectionable.
- B. All equipment utilized by the Contractor at the Landfill shall be equipped with adequate muffler systems to minimize on-site noise generation.

3.06 ODOR CONTROL

- A. Suitable measures shall be taken to minimize odors at the Landfill. Any odors originating from the Contractor's operations which expose solid waste shall be minimized by immediately covering with adequate layers of approved cover material.
- B. Under no circumstances shall exposed solid waste remain uncovered overnight.

3.07 LITTER CONTROL

- A. Any litter generated by the Contractor's operation, whether from disturbance of existing buried solid waste or generated in the course of performing the work under Contract, shall be collected and properly disposed of on a daily basis.

3.08 VECTOR CONTROL

- A. Sanitary measures and conditions shall be maintained at the Landfill, by the Contractor, at all times in order to avoid harboring, feeding, and breeding of vectors.

3.09 FIRE PREVENTION AND CONTROL

- A. Open burning of any type within the Landfill or on adjacent property is prohibited.

- B. The Contractor shall take necessary precautions and implement procedures to prevent and control fires, whether on the Landfill or within a piece of equipment used in performing the work under Contract.

3.10 PROHIBITED CONSTRUCTION PROCEDURES

- A. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and floodplains is strictly prohibited. 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.
- B. The Contractor shall comply with the following requirements regarding prohibited construction procedures as follows:
 - 1. Dumping of spoil material into any stream corridor, any wetland, any surface waters, or at unspecified locations.
 - 2. Indiscriminate, arbitrary or capricious operation of equipment in any stream corridors, any wetlands or surface waters.
 - 3. Pumping of silt-laden water from trenches or other excavations into any surface waters, any stream corridors or any wetlands.
 - 4. Damaging vegetation adjacent to, or outside of, the area of the work.
 - 5. Disposal of trees, brush and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.
 - 6. Permanent or unspecified alteration of the flow line of any stream.
 - 7. Open burning of project debris.
 - 8. Location of storage stockpile areas in environmentally sensitive areas.
 - 9. Disposal of excess or unsuitable excavation material in wetlands or floodplains even with permission of the property owner.

END OF SECTION

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SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for project meetings.

1.02 PRECONSTRUCTION CONFERENCE

- A. The Engineer will schedule and administer a pre-construction conference.
- B. The pre-construction conference will be scheduled and administered within fourteen (14) calendar days after the dated "Notice to Proceed". The Contractor shall be prepared to address such topics as projected construction schedules, major personnel, critical work areas, construction facilities and shop drawing submittals.

1.03 PROGRESS MEETINGS

- A. The Engineer will schedule and administer progress meetings and specially called meetings throughout the duration of the Work at minimum monthly intervals.
- B. The time and location of such meetings shall be designated by the Engineer and shall be convenient for all parties involved.
- C. The Engineer will, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to participants, and those affected by decisions made.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for submission of schedules and shop drawings.

1.02 PROGRESS SCHEDULE

- A. Refer to Section 01310 Construction Progress Schedule for Critical Path Method (CPM) construction scheduling requirements.
- B. Special attention is directed to the requirement that the Contractor shall start the Work, as specified under this Contract, no later than thirty (30) calendar days after the execution of the Contract Documents, unless otherwise directed by the Owner. The Contractor shall comply with all pre-construction requirements as specified. The Owner reserves the right to delay the commencement of the Work or any part thereof if the specified requirements as determined by the Engineer have not been satisfied. The Owner further reserves the right to limit or, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest and/or safety to do so.
- C. The Contractor shall contact the appropriate town or city authorities concerning any public or semi-public events that may occur during the construction period that may affect construction. The Contractor alone shall be responsible for arranging his construction sequence to conform to any restrictions these events may impose. No claims for extras will be allowed because of any delay, extra materials handling, extra excavation, etc. caused by the imposed restrictions. However, additional time may be granted for completion of the work to compensate for delays caused by said restrictions.

1.03 SHOP DRAWINGS

- A. Submit all shop and working drawings through agreed upon electronic Shop Drawing Submittal and tracking program. Shop Drawings shall be provided for materials and equipment to be permanently incorporated into the work and shall include items such as concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.
- B. Products, materials, equipment, appurtenances, and fasteners incorporated into this project are subject **to the American Iron and Steel requirements of P.L. 113-76, the Consolidated Appropriations Act of 2014**. Proper certification shall be included with the initial Shop Drawing submission. Submissions that do not include the required certifications will be rejected without review.
- C. A maximum of two (2) submittals of each shop drawing will be reviewed by the Engineer. If more submittals are required due to the Contractor's neglect or failure to fulfill the requirements of the Contract plans and specifications, or to make corrections or modifications required by the Engineer in the review of the first two submittals, the Engineer will review the submittal

and the Contractor will be responsible for the cost of the review, as determined by the Owner based on the Engineer's documentation of time and rates for additional services established in the Engineering Agreement between the Owner and the Engineer.

- D. Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When the dimensions are of particular importance, or when specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.
- E. When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings.
- F. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings to eliminate delay to the Work due to the absence of such drawings. All shop and working drawings must be submitted to the Engineer within thirty (30) calendar days prior to incorporation into the Work, unless otherwise permitted by the Engineer. **Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals.** The schedule shall identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. Prior to and during the progress of the Work the schedule shall be revised and resubmitted as requested by the Engineer.
- G. No material or equipment shall be purchased or fabricated for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.
- H. Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which review is required.
- I. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24 inch by 36 inch sheets, except those which are made by changing existing standard shop and working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitable numbered. Submitted shop drawings shall be accompanied by a letter of transmittal, completed by the Contractor as provided by the Engineer.
- J. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.
- K. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.

- L. The review of shop and working drawings by the Engineer will be general only, and nothing contained in this Section shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance as specified. The Contractor shall be responsible for errors and omissions in shop drawings.
- M. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires, appurtenances, or layouts etc., either existing or as detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do the work necessary to make such modifications.
- N. The Contractor shall furnish additional copies of shop drawings or catalog cuts when so requested.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01310

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for computer generated Critical Path Method (CPM) construction scheduling and Narrative progress report.
- B. No portion of this specification shall take precedent over SECTION 00500-Contract Agreement.

1.02 SUBMITTALS

- A. Submit in accordance with SECTION 01300-Submittals
 - 1. Quality Assurance/Control Submittal
 - a. Name and version of CPM software proposed for use.
 - b. List of construction projects completed on which progress of work was controlled with CPM software.
 - 2. Schedule
 - a. Within **14 days** following the receipt of the Notice to Proceed, the Contractor shall submit **two** color copies of a computer generated schedule and a list of activities to the Engineer. Following review by the Engineer and Owner the Contractor shall meet with the Engineer and Owner to discuss the review. The Contractor shall incorporate the Engineer's comments into the schedule and submit eight color copies of the revised schedule within 14 days following receipt of the Engineer's comments.

PART 2 PRODUCTS

2.01 SOFTWARE

- A. Computer based scheduling software used by the Contractor shall be the product of a recognized commercial computer software producer and shall be capable of meeting the requirements specified herein.

PART 3 EXECUTION

3.01 PREPARATION

- A. General
 - 1. The Contractor shall prepare his proposed CPM schedule based on a breakdown of work tasks that he has developed.
 - 2. The construction schedule and updates shall be prepared by the Contractor or the Contractor's qualified consultant.

B. Schedule

1. Each schedule shall be prefaced with the following summary data:
 - a. Contract name and number
 - b. Contractor's Name
 - c. Contract duration
 - d. The effective or starting date of the schedule
 - e. Revision date of the latest schedule.
2. The CPM schedule shall be sequenced by early start date and shall include the following minimum items:
 - a. Activity Name
 - b. Estimated duration
 - c. Activity description
 - d. Early start date (calendar date)
 - e. Early finish date (calendar date)
 - f. Latest allowable start date (calendar date)
 - g. Latest allowable finish date (calendar date)
 - h. Status (whether critical)
 - i. Estimated cost of the activity
 - j. Float (total and free)
 - k. Major milestones
3. Separate milestones shall be included for Notice-to-Proceed and Project Completion Date.
4. Activities shall include major components of the work including submittals that might impact the critical path, subcontractor work, major and critical equipment design, fabrication, testing, delivery and installation times, system/subsystem/component testing, process and facility startup, training, demobilization, project cleanup and closeout. Critical portions of process instrumentation and control system work, shall be defined in detail in a sub schedule.
5. The sum of the costs assigned to the activities shall be equal to the Contract price. Activity costs shall not be assigned to submittals or submittal reviews. Comply with SECTION 01026-Schedule of Values. Provide a table showing the anticipated monthly percentage of completion, based on the total contract price.
6. Critical activities, predecessors, free float and total float shall be clearly displayed on the schedule in graphical form. Schedules that contain activities showing negative float or that extend beyond the contract completion date will not be approved.
7. Each schedule submittal shall also include a list of activities in the order in which the activities will be performed, along with activity durations, activity predecessors, type of predecessor (finish-start, finish-finish, start-start, lead/lag), and any dependency or required date.
8. The schedule shall be based on a standard 5-day work week with allowance for holidays and adverse weather.
9. Engineer's approval of the CPM schedule is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work prior to the contract completion date. Omissions and errors in the approved CPM schedule shall not excuse performance less than that required by the Contract. Approval by the Engineer in no way makes the Engineer an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Engineer, of the CPM schedule.

C. Narrative Progress Report

1. Include as a minimum:
 - a. Summary of work completed during the previous period (since submission of last narrative progress report).
 - b. Explanation for variations between actual work completed in previous period and planned work as reported in last period.
 - c. Summary of work planned during the next period.
 - d. Current and anticipated delaying factors and their estimated impacts on other activities and milestones, both critical and non-critical.
 - e. Corrective actions taken or proposed.
2. A Narrative Progress Report shall be submitted monthly to the Engineer, at least 5 working days prior to the progress meeting.
3. At the discretion of the Engineer, the Contractor may be required to submit a revised CPM schedule showing completion to date and any changes to the previous schedule.

3.02 MONITORING SCHEDULE

- A. The CPM approved construction schedule shall be used by the Contractor throughout the duration of the project for planning, organizing, and directing the Work, and for reporting progress of the Work
- B. The Contractor is solely responsible for monitoring schedule compliance. When a delay to the critical path occurs, the Contractor shall immediately notify the Engineer in writing. Within one week of the notification, the Contractor shall submit for the Engineer's approval, a description of proposed actions to return the project to schedule.

3.03 MODIFYING SCHEDULE

- A. If the Contractor desires to make changes in his method of operating which affect the approved CPM schedule, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer approves these changes, the Contractor shall revise and submit for approval, without additional cost to the Owner, all of the affected portions of the CPM schedule.
- B. It may be necessary for the contract schedule or completion time to be adjusted by the Owner to reflect the effects of job conditions, weather, technical difficulties, strikes, unavoidable delays on the part of the Owner or its representatives and other unforeseeable conditions which may indicate schedule adjustments or completion time extensions. Under such conditions, the Engineer will direct the Contractor to reschedule the work or contract completion time to reflect the changed conditions and the Contractor shall revise his schedule accordingly.
- C. Float time is a project resource available to both the Contractor and the Owner to meet contract milestones and completion dates. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float suppression techniques shall be shared to proportionate benefit of OWNER and CONTRACTOR.

- D. If the Contractor provides an accepted schedule with an early completion date, the Owner reserves the right to reduce the Time of Completion to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Contractor's quality control of products, suppliers, manufacturers, services, site conditions, and workmanship, to produce Work of specified quality.

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Comply fully with manufacturers' instructions, including each step in sequence.
- B. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- D. Perform work by persons qualified to produce workmanship of specified quality.
- E. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.03 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified to be removed, clear area only after field sample has been accepted by the Engineer.

1.04 CERTIFIED WELDERS

- A. Structural welds shall be made only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welders Society, to perform the type of work required.
- B. Pipe welds shall be made only by operators who have been qualified by the National Certified Pipe Welding Bureau and each operator's qualification record shall be submitted to the Engineer before any work is performed.
- C. Shop welding shall be in accordance with the "Code for Welding in Building Construction".

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Qualification, duties and responsibilities of testing laboratories.
2. Coordination and scheduling responsibilities of the Contractor.

B. Related Sections

1. Section 01600 - Materials and Equipment

1.02 RESPONSIBILITY

- A. Contractor is responsible for hiring an Independent Laboratory to conduct sampling and analyses. The Contractor has full responsibility for the scheduling, coordination and payment.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. E329, Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.04 REQUIREMENTS

A. Work included:

1. Cooperate with the Owner's selected testing agency and all others responsible for testing and inspecting the Work.
2. Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.
3. Where no testing requirements are described, but the Owner directs testing, the Contractor shall provide testing under the requirements of this Specification.

B. Work not included:

1. Selection of testing laboratory: The Owner will select a qualified independent testing laboratory.

1.05 QUALITY ASSURANCE

A. Qualifications

1. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Regulatory requirements

1. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

2. Regulatory Requirements Inspections and tests required by codes or ordinances, or by a plan approved authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01600 - Materials and Equipment.
- B. Promptly process and distribute, to the Engineer, required copies of test reports and instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

1.07 SCHEDULING

- A. Establishing schedule
 1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
 2. Provide all required time within the construction schedule.
 3. Coordinate testing activity with the appropriate testing laboratory.
- B. Revising schedule
 1. When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.
- C. Adherence to schedule
 1. When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Site Tests
 1. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
 2. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

END OF SECTION

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SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for temporary utilities required during construction.

1.02 GENERAL REQUIREMENTS

- A. The Contractor is responsible for payment of all costs associated with the installation and operation of all temporary utilities necessary for the completion of the work. The General Contractor shall arrange with the Engineer and Owner methods of determining monthly utility costs for Temporary Utilities prior to connection of any temporary systems. The Contractor shall pay the Owner on a monthly basis for all temporary utility costs. The Temporary Utilities to be paid by the Contractor include but are not limited to the following: Electricity, Water, Sanitary, Heating, Ventilation, Plumbing and other services required to complete the work.

1.03 TEMPORARY WATER

- A. Temporary pipe lines and connections from the permanent service lines, necessary for the use of the General Contractor and his Subcontractors shall be installed, protected, and maintained at the expense of the General Contractor.
- B. Provide an adequate supply of drinking water from an approved source of acceptable quality, satisfactorily cooled, for his employees and those of his Subcontractors.

1.04 TEMPORARY ELECTRICITY

- A. Provide electrical energy required for temporary lighting and power.
- B. Temporary wiring of a special nature shall be paid for by the Contractor including but not limited to special circuits required by electric welders, elevators, lifts, pumps or other special equipment requiring high-amperage and/or special voltage service and exterior lighting circuits for protection against vandalism, public warning lights and lights for advertising, etc.
- C. The General Contractor and all Subcontractors, individually, shall furnish all extension cords, sockets, motors, and accessories required for their work. They shall also pay for all temporary wiring of construction offices and buildings used by them.
- D. Temporary wiring installed by the Electrical Subcontractor shall be removed after it has served its purpose.
- E. Electrical work to be done in accordance with applicable codes.
- F. Refer to special requirements for Myles Standish Pump Station in Section 01015.

1.05 TEMPORARY SANITARY FACILITIES

- A. Provide adequate sanitary facilities for the use of those employed on the Work. Sanitary facilities shall be made available when the first employees arrive on the site of the Work, be properly secluded from public observation, and be maintained during the progress of the Work in suitable numbers.

- B. Maintain sanitary facilities in an orderly and sanitary condition at all times and enforce their use. Rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or any adjacent property.

1.06 TEMPORARY HEATING

- A. Within 30 calendar days after the execution of this Contract, submit in writing to the Engineer for approval, three copies of method and time schedule for heating during construction which shall concur with his progress schedule submitted under Specification Section 01300.
- B. The installation and operation of heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection. Heating devices which may cause damage to finish surfaces shall not be used.
- C. After the permanent heating system has been installed, tested, and made ready for operation, the Contractor may, at his own risk and expense, use it for providing heat for protection of the Work. He shall provide and pay for all fuel and care necessary, and, when the Work is ready for acceptance, he shall, at his own expense, put the system into first-class condition, even to the extent of replacing worn or damaged parts as directed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01525

TEMPORARY ENCLOSURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for protecting portions of the Work which are affected by inclement weather conditions.
- B. Provide "Weather Protection" and heat to permit construction work to be carried on during the months of November through March. These Specifications are not to be construed as requiring enclosures or heat for operations that are not economically feasible to protect in the judgment of the Engineer. Included in the preceding category, without limitation, are such items as site work, excavation, pile driving, steel erection, erection of certain "exterior" wall panels, roofing, and similar operation.

1.02 SUBMITTALS

- A. Within 30 calendar days after execution of this contract, submit in accordance with Specification Section 01300, proposed methods for "Weather Protection".

1.03 WEATHER PROTECTION

- A. Weather Protection shall be provided for protection of that work adversely affected by moisture, wind and cold, by covering, enclosing and/or heating. This protection shall provide adequate working areas during dates consistent with the approved Progress Schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations.
- B. Furnish and install all enclosures and be responsible for all costs, including heating required to maintain a minimum temperature of 40 degrees F., at the working surface. This provision does not supersede any specific requirements for methods of construction, curing of materials or the applicable general conditions set forth in the Contract Documents with added regard to performance obligations of the Contractor.
- C. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices. Heating devices which may cause damage to finish surfaces shall not be used.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

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SECTION 01560

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for cleaning, maintenance of the site, barriers and fences required during construction.

1.02 CLEANING DURING CONSTRUCTION

- A. Unless otherwise specified under the various trade Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.
 - 1. Control accumulation of waste materials and rubbish; periodically dispose of off-site. Bear all costs, including fees resulting from disposal.
 - 2. Clean interior areas prior to start finish work and maintain areas free of dust and other contaminants during finishing operations.
 - 3. Maintain project in accordance with all local, State and Federal Regulatory Requirements.
 - 4. Store volatile wastes in covered metal containers, and remove from premises.
 - 5. Prevent accumulation of wastes that create hazardous conditions.
 - 6. Provide adequate ventilation during use of volatile or noxious substances
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.
 - 4. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
 - 5. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.
 - 6. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and wind blown debris, resulting from construction operations.
 - 7. Provide on-site containers for collection of waste materials, debris, and rubbish.
 - 8. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas off the construction site.
 - 9. Handle material in a controlled manner with as little handling as possible. Do not drop or throw materials from heights.
 - 10. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.
 - 11. During its progress, the work and the adjacent areas affected thereby shall be kept 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.
 - 12. 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.

1.03 DUST CONTROL

- A. Provide adequate means for the purpose of preventing dust caused by construction operations throughout the period of the construction contract.
- B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions or performance obligations of the General Contractor.

1.04 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize amount of bare soil exposed at one time.
- C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts for clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Construct sediment control devices for discharge from dewatering trenches.
- G. Construct all sedimentation control devices shown on the plans.

1.05 NOISE CONTROL

- A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.
- B. Execute construction work by methods and by use of equipment which will reduce excess noise.
 - 1. Equip air compressors with Silencers, and power equipment with mufflers.
 - 2. Manage vehicular traffic and scheduling to reduce noise.

1.06 POLLUTION CONTROL

- A. Special care shall be taken to prevent contamination or muddying up or interfering in any way with the stream flows, if any along the line of work. No waste matter of any kind will be allowed to discharge into the stream flows or impounded water of any pools or other bodies of water.

1.07 SURFACE WATER CONTROL

- A. Take all precautions to prevent damage to the work or equipment by high waters or by storms. The Engineer with the approval of the Owner may prohibit the carrying out of any work at any time when in his judgment, high water or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress.
- B. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Engineer may require, at no additional expense to the Owner.

1.08 BARRIERS AND ENCLOSURES

A. Fences and Barricades

- 1. Provide and maintain temporary fences, barriers, lights, guardrails, and barricades as indicated in the Contract Documents, or as necessary to secure the Work and adjacent property, and protect persons and property.
- 2. Obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate tasks requiring items mentioned herein.

B. Protection of Trees

- 1. The Contractor shall take care not to harm trees along the sides of roads or with in the existing facility in which the construction work is to be done or trees on adjacent lands except as indicated on the drawings or with the written permission of the Owner and any other owner of the trees involved. Care shall be taken not to cut tree roots so as to harm the growth of trees to remain.
- 2. If, in the opinion of the Engineer, any trees damaged during construction can be repaired, the Contractor shall satisfactorily repair same at no further cost to the Owner.
- 3. If, in the opinion of the Engineer, any tree damaged during construction cannot be repaired and should be removed, the Contractor shall satisfactorily remove and replace, in kind, same at no further cost to the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01570

TRAFFIC REGULATIONS
(MASSACHUSETTS)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for traffic control for the duration of the Contract.

1.02 REFERENCES

- A. Manual of Uniform Traffic Control Devices (MUTCD) Latest Edition, including all latest revisions.

1.03 PERFORMANCE REQUIREMENTS

- A. Contractor shall have the sole responsibility for the maintenance and protection of traffic.
- B. An authorized representative of the Contractor shall be available on a 24-hour basis for the duration of the Contract for the purpose of correcting construction related impediments or hazards.

1.04 SHOP DRAWINGS

- A. In accordance with SECTION 01300 – SUBMITTALS, submit a traffic plan delineating requirements of this section, the Contract Drawings, and the City of Taunton’s requirements.
- B. Traffic control plans shall detail all typical work zones and detours.

1.05 SITE CONDITIONS

- A. Replace at no cost to the Owner pavement markings, legends and lane arrows removed or damaged by the construction operation.
- B. Restore temporary detours to original condition.
- C. Replace traffic signal loops damaged during construction within 72 hours.

1.06 SCHEDULING

- A. There shall be no time limitations on construction operations except those hours and locations where noise regulations may apply and except as required for the maintenance of traffic as required by the City of Taunton’s requirements.
- B. Keep closing of travel lanes to a minimum.
- C. Notify city departments 48 hours prior to construction operations on travel ways.

1. Police Department (508-824-7522).
2. Fire Department (508-821-1542).
3. Department of Public Works (508-821-1431).

PART 2 PRODUCTS

2.01 TRAFFIC CONTROL DEVICES

- A. In accordance with the MUTCD.

PART 3 EXECUTION

3.01 INSTALLATION OF TRAFFIC CONTROL DEVICES

- A. In accordance with the MUTCD.

3.02 PROTECTION OF TRAFFIC

- A. Barricade trenches and roadway excavations at the end of each work period with temporary precast concrete barriers, properly lighted and marked to guide traffic to designated travel lane. Or other means acceptable to the Engineer and approved on the Traffic Plan.
- B. Maintain and protect traffic movements for the entire length of the project.
- C. Keep one lane of traffic open at all times except for brief stoppages dictated by the construction operation involving safety of vehicles in the travel lanes.
- D. Maintain access to business and private ways during construction operations.
- E. Furnish sufficient number of signs, temporary precast concrete barriers, warning lights, drums and traffic cones to warn traffic of construction and guide traffic through the construction area in accordance with the MUTCD.

3.03 POLICE DETAILS

- A. Provide service of uniformed police details as required to complete construction as required by the Owner.

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for delivery, storage, handling and installation of systems, materials, manufactured units, equipment, components, and accessories used in the work.

B. Related Sections

1. Section 01300 - Submittals

1.02 DELIVERY

A. Refer to Specifications' Sections for requirements pertaining to delivery and handling of materials and equipment.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dry.

C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

1.03 STORAGE AND PROTECTION

A. Refer to Specifications' Sections for requirements pertaining to storage and protection of materials and equipment.

B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.

C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

E. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged, and are maintained under required conditions.

1.04 INSTALLATION STANDARDS

- A. Comply with Specifications and referenced standards as minimum requirements.
- B. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.
- C. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.
- D. Perform work by persons qualified to produce workmanship of specified quality.
- E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- F. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01300 - Submittals, distribute copies to persons involved, and maintain one set in field office.
- G. Perform work in accordance with details of instructions and specified requirements.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01631

USE OF OTHER THAN FIRST NAMED MANUFACTURER

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section includes requirements related to the Contractor's responsibilities when using a named manufacturer or product other than the first named.

1.02 EQUIVALENT MATERIALS AND EQUIPMENT

- A. Whenever a material, article, or method is specified or described by using the name of a proprietary product or the name of a particular manufacturer(s) or vendor(s), followed by the phrase "or equal," the specific item mentioned shall be understood as establishing the type, function, dimension, appearance, and quality desired and is to be the basis upon which bids are to be prepared, subject to the provisions of this Section.
- B. In every instance, the design was completed using criteria required to accommodate the first named manufacturer. When practical, other named manufacturers were included in the Technical Specifications based upon performance and design criteria comparable to the first named. However, in some instances, the size, shape, loadings, configuration, and/or other design criteria for other named manufacturers may require redesign of the Work. Other named manufacturers may be used subject to the requirements of this Section.
- C. When the Contractor uses any manufacturer or product other than the first named in the specifications, which use requires modification to the Work, the Contractor shall, to the satisfaction of the Program Manager, review and revise the design of the Work, including coordination with other Technical Specification sections to ensure that all component units fit and function as a whole, to properly accommodate the use of that product.
- D. The Contractor shall bear the costs and liability for all redesigned elements of the Work necessary to properly accommodate the proposed item.

1.03 SUBMITTALS

- A. In addition to the requirements of Section 01300, the Contractor shall submit complete data and engineering documents that provide a complete analysis of the proposed item and the extent of the redesign of the Work necessary to properly incorporate the proposed item into the Work. The Contractor shall:
- B. Identify each and every element of the design of the Work that must be modified to:
 - 1. Accommodate the proposed item.
 - 2. Coordinate the proposed item with the overall design, inclusive of all related disciplines.
 - 3. Ensure the proper functioning of the entire system in which the item is to be incorporated.

- C. Include complete engineering drawings, bearing the seal of a Professional Engineer registered in the Commonwealth of Massachusetts, addressing all requirements in 1.02 above.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF USE OF OTHER THAN FIRST NAMED MANUFACTURERS

SECTION 01665

SERVICES OF MANUFACTURER'S REPRESENTATIVES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for services provided by manufacturer's representatives.

1.02 SERVICES OF MANUFACTURER'S REPRESENTATIVES

A. General

1. Arrange for a qualified factory trained service representative from each company manufacturing or supplying certain equipment and systems, as listed in the Table at the end of this section and as specified in Division 11 through Division 16, to perform the duties described herein.
2. Qualified factory trained service representative shall be approved by the Engineer
3. All 8-hour days specified herein and in other sections of the specifications are exclusive of travel time
4. Services of Manufacturer's Representative shall not commence until an Operation and Maintenance Manual has been submitted and approved for each piece of equipment and system.

B. Supervision of Installation

1. Provide on-site supervision and advice to the Contractor to insure that proper procedures are followed during equipment installation.

C. Equipment Checkout

1. Inspect, align, operate, test and adjust the equipment after equipment installation has been completed and equipment is presumably ready for operation, but before it is operated by others.
2. The inspection shall include, but shall not be limited to, the following points as applicable:
 - a. Soundness (without cracked or otherwise damaged parts)
 - b. Completeness in all details as specified
 - c. Correctness of setting, alignment, and relative arrangement of various parts
 - d. Adequacy and correctness of packing, sealing and lubricants.
3. Operate, test and adjust the equipment, as required, to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.
4. Upon completion of the work, submit a complete signed report of the result of the inspection, operation, adjustments and tests to the Engineer via the Contractor. The report shall include:
 - a. Detailed descriptions of the points inspected and work completed
 - b. Deficiencies noted and/or corrected
 - c. Tests and adjustments made
 - d. Quantitative results obtained if such are specified
 - e. Suggestions for precautions to be taken to ensure proper maintenance

- f. A certificate that specifically states 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 manufacture's warrantee null and void".

D. Field Acceptance Test

1. Tests shall be conducted by the Contractor, with assistance from the manufacturer's representative, after the Engineer has reviewed completed and equipment checkout report
2. Manufacturer's representative shall be present during field acceptance tests

E. Pre-Startup Operator Training

1. General

- a. Provision for classroom and hands on training to plant personnel in the operation and maintenance of the equipment prior to placing the equipment in full operation.
- b. Provide the Owner's personnel and their consultants with sufficient information and skills training on the theory, design, site specific operation and maintenance practices (including items such as routine monitoring with normal and abnormal parameters, troubleshooting techniques, and preventive and corrective maintenance requirements) to insure that equipment and systems can be efficiently and effectively operated and maintained by the trainees upon completion of the training.
- c. Training shall be a combination of classroom, field observance and hands-on applications.
- d. Provide the following as specified herein:
 - 1) Lesson Plans
 - 2) Trainee Manuals
 - 3) Catalog of training materials.
- e. The Contractor shall provide a credit to the Owner for any unused instructor hours.
- f. Training classes shall be based on the approved Contractor Operation and Maintenance Manual.
- g. Conduct the training at scheduled times in accordance with the Contractor's approved comprehensive training schedule for all equipment, system and components. All training shall be coordinated and scheduled with the Owner a minimum of 7 days in advance. All training sessions will be conducted during the day shift. Currently the day shift is approximately 7:00 AM to 3:00 PM. For scheduling and training effectiveness, no one class will be longer than 4 hours.

2. Operations Sessions

- a. Overview of the equipment and its' auxiliary support/systems covering nomenclature, function and theory of operation.
- b. General safety requirements for operation of the equipment and its' auxiliary/support systems, including suggested safety equipment.
- c. Pre-start-up safety and equipment check.
- d. Equipment and auxiliary/support systems start-up procedures covering manual and automatic modes, if available.
- e. Routine operation and monitoring requirements; including specifics on normally expected ranges for items such as oil, water pressure and temperatures, discharge pressures, sensory observations, etc., procedures to change operating parameters (such as air or flow rates).
- f. Equipment/systems shut down procedures covering manual and automatic modes (if applicable).
- g. Operational troubleshooting of equipment and auxiliary/support systems.
- h. Procedures for handling non-routine operational problems such as response to alarms, power failures, emergency shutdown, auxiliary/support system failures, etc.

3. Maintenance Sessions

- a. If session is specific to a discipline; (e.g., electrical, mechanical, I&C), include only appropriate maintenance items for the discipline. If session is to include multiple disciplines, include all items for those disciplines and indicate in submittal outline which discipline the material refers to.
- b. For All Disciplines provide:
 - 1) An overview of the equipment and its' auxiliary/support systems covering nomenclature, function and theory of operation.
 - 2) General safety requirements for maintenance of the equipment and its' auxiliary/support systems appropriate to each discipline including suggested safety equipment and practices. Cover local/remote lockout procedures, safe procedures for handling alarms and built in safety devices during preventive and corrective maintenance.
 - 3) Overview of pre-start-up, routine operation monitoring, and shutdown procedures covering automatic and manual modes (if applicable).
- c. For Each Specific Discipline provide:
 - 1) Preventive maintenance procedures to be followed; include parts' lube quantities, types, frequencies, application points, time requirements to perform procedures, etc.
 Note: Information should be provided to trainees from the O&M manuals which cross references manufacturer's lube requirements.
 - 2) Specific procedures to cover adjustment requirements for alignment, wear, calibration, etc. for all preventive maintenance and corrective maintenance procedures, including time required to perform.
 - 3) Special tools, techniques or procedures required for either preventive or corrective maintenance of equipment or its' auxiliary support systems.
 - 4) Assembly/disassembly procedures required for preventive or corrective maintenance, including time required to perform.
 - 5) Maintenance troubleshooting of equipment and auxiliary/support systems.

F. Post-Startup Services

1. Provision for assistance to the Owner in the calibration, tuning and troubleshooting, plus any additional training which may be required during the one-year guarantee period.

1.03 SUBMITTALS

1. Submit instructor qualifications, training outline, and lesson plans 90 calendar days prior to pre-startup operator training. Qualifications of the factory trained service representative, as defined below.
2. Submit trainee manuals at least 30 calendar days prior to scheduled training.
3. Training Outline/ Lesson Plans:
 - a. 4 copies
 - b. Training outline/lesson plans to cover each major trainee group (i.e.: operations, electrical maintenance, instrumentation, etc). If the same session outline is to be used for more than one type of trainee group, such as one which would cover equipment identification and principals of operation, this information should be so indicated on the outline. The outline should be detailed and include length of session for each major topic and type of session; i.e., field or classroom.
 - c. The lesson plan shall be cross referenced to the trainee manuals provided and include instructor references for the use of training aids, training strategies, etc. They should contain sufficient technical material to guide the instructor in the delivery of the training material session. Lesson plans are to be provided for each separate technical discipline to be trained. Generic "informational" lesson plans may be used for

multiple trainee discipline target groups. The specific number of lesson plans for each session will be determined by the complexity, content and objectives of the subject equipment covered.

- d. The purpose of the manual is to provide specific guidance for the instructor and the trainees on what is to be taught and how, as well as to insure consistency and completeness of the sessions when they are presented to different groups of the same target trainee group.
4. Trainee Manuals
 - a. 4 final copies.
 - b. Key trainee manuals to the training outline. Copies should be available to pass out to each trainee at the session, they are to be retained by the trainee for future use. This trainee manual is not the O&M manual required in the specification, however, similar materials may be included as appropriate.
 - c. The purpose of the manual is to provide an organized package of information for the trainee, which will be used during the training sessions as well as for future reference material.
 - d. The organization of the manual should correspond to the training outline. Material in the manual should include information on the training topics, the training outline, and other relative reference material. Specifically, all manuals should be geared toward an eighth grade level of reading.
 - e. Manuals for Operations training sessions should include a description of the equipment, pre-start-up checks, start-up and shutdown procedure, specific monitoring checks including expected parameters, troubleshooting and safety procedures, etc. as described previously.
 - f. Manuals for Maintenance training sessions should include a description of the equipment, pre-start-up checks, start-up and shutdown procedure, specific monitoring checks including expected parameters, troubleshooting and safety procedures, etc. as described previously.
 5. 2 copies of a catalog of all training materials including training outline, lesson plans and trainee manuals.

1.04 QUALITY ASSURANCE

A. Qualifications

1. Factory trained service representative shall have the training and experience to provide technical and/or process related advice, and/or assistance, relating to the installation, operation, maintenance and utilization of the products that he represents. Additional qualifications may be specified elsewhere.
2. Representative is subject to acceptance by Engineer. No Substitute representatives will be allowed unless prior written approval by Engineer has been given.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

- A. Equipment and Components Requiring Services is listed in the Table at the end of this section.

B. Provide a credit to the Owner for unused service manhours as specified below, at the manufacturer's published field service rate plus travel costs.

SERVICES OF MANUFACTURER'S REPRESENTATIVE
Manhour Requirements Table

Specification Section	Section Number	Supervision of Installation	Equipment Checkout	Field Acceptance Tests	Pre-Startup Operator Training	Post-Startup Services
Submersible Sewage Pumps	11305	4	4	4	4	8
Hoisting Equipment	14600	4	4	4	4	4
Generator and ATS	16612	4	4	8	4	8
Variable Frequency Drives	16495	8	8	8	8	40
Security Alarm System	16720	4	4	4	4	4
Submersible Transducers	17300	4	4	4	4	8
Instrumentation & Control System	13300	N/A	16	16	16	40

Hours presented are representative of those required for each station where applicable improvements are made

EQUIPMENT CERTIFICATION

Owner: _____ Date: _____

Project : _____

Contractor: _____

Equipment Manufacturer: _____

Equipment: _____

Specification Section: _____

As an authorized representative of the Equipment Manufacturer, the undersigned certifies that the equipment listed above conforms to the requirements of the construction contract between the Contract and the Owner. The undersigned further certifies that the equipment has been installed in accordance with the Manufacturer's written instructions, that the equipment is ready for permanent operation and that nothing in the installation will render the Equipment Manufacturer's warranty null and void.

(Authorized Manufacturer's Representative)

Date: _____

(Witness)

Date: _____

Remarks: _____

EQUIPMENT TRAINING CERTIFICATION

Owner: _____ Date: _____

Project: _____

Contractor: _____

Equipment Manufacturer: _____

Equipment: _____

Specification Section: _____

As an authorized representative of the Equipment Manufacturer, I certify that I have trained the Owner's personnel in the proper operation and maintenance of the above equipment.

(Authorized Manufacturer's Representative) Date: _____

The following personnel listed below attended the training session(s):

(Owner's Representative) Date: _____

(Beta Group, Inc. Witness) Date: _____

END OF SECTION

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SECTION 01680

EQUIPMENT AND SYSTEM CHECKOUT, CERTIFICATIONS AND TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements and procedures for physical checkout certification, and testing of equipment.

1.02 DEFINITIONS

- A. Shop Testing is defined as testing that is done by the manufacturer either at the place of manufacture, the place of assembly, or at another location where the required testing apparatus is located, for the purpose of proving that the equipment meets the requirements of the pertinent technical specification(s).
- B. Equipment Checkout, Inspection and Certification is defined as the process of physically inspecting products after they have been installed in the work, and then certifying that the products have been properly and completely installed, and are ready for field and/or functional testing.
- C. Field Testing is defined as testing that is performed by the Contractor with supplier assistance on products they have been installed in the work and after the performance of physical checkout, for the purpose of proving that the tested products meet the requirements of the pertinent technical specifications. While field testing can be described as "shop testing in the field", it may be required regardless of whether or not shop testing was performed on the same piece of equipment or material.
- D. System Testing is defined as testing performed on a "system" normally comprised of two or more pieces of equipment, after the equipment has been installed in the work, and after physical checkout and field testing has been completed, for the purpose of providing that the system meets requirements as specified and as indicated.
- E. Manufacturer's Representative, sometimes referred to as the Factory-Trained Service Technician, is defined as a person or persons provided by the manufacturer, who is qualified by having the training and experience to provide technical and/or process related advice, and/or assistance, relating to the installation or utilization of the products provided by that same manufacturer, for installation and utilization in the work. Such training and experience shall include a minimum of three years participation in similar work including no less than three similar projects during this three year period. The qualifications of each representative must be submitted to the Engineer for approval at least 30 days prior to their first site visit.
- F. The Testing Checkout Coordinator is defined as the person provided by the contractor to coordinate and oversee the total spectrum of testing and inspection activities required by the contract documents. The testing and checkout coordinator shall have been in responsible charge of at least two similar projects in the last four years.

1.03 ROLES AND RESPONSIBILITIES

- A. The Contractor shall provide all outside services, materials, labor, supplies, test equipment and other items necessary to perform the testing specified herein. In addition, arrange for and provide the participation or assistance of survey crews, engineers, quality control technicians, manufacturers' representative(s), and required governmental agency representatives.

1.04 CHECKOUT PLAN

- A. The Contractor shall submit a checkout plan based upon the requirements defined herein to the Engineer. Six copies of checkout plan (preliminary) shall be submitted for review within 90 calendar days prior to the proposed date of the first test, whichever occurs first. The plan shall define:
 - 1. The logical and systematic performance of physical inspections, shop, field, and system tests.
 - 2. A list of all shop tests, and supplier certifications, including those required by the applicable technical specifications. Provisions shall also be included for retesting in the event it is required.
 - 3. Participants in the testing.
 - 4. Special test equipment.
 - 5. Sources of the test media (water, power, air) and the proposed method of delivery of the media to the equipment to be tested.
 - 6. Ultimate disposal of the test media.
- B. The plan shall be reviewed by the Engineer, modified or revised as necessary by the Contractor, then approved by the Engineer. The Contractor shall continue to update the checkout plan, working in conjunction with the Engineer prior to the start of the scheduled equipment checkout and functional testing activities.
- C. The Contractor shall designate, in the checkout plan, a testing and checkout coordinator to coordinate and manage the activities defined in the checkout plan, as approved by the Engineer.

1.05 EQUIPMENT AND SYSTEM CHECKOUT AND CERTIFICATIONS

- A. Checkout is defined as inspection by the Contractor, Engineer and Owner to verify conformance to the contract drawings and specifications. Checkout procedures will be conducted by the Contractor in the presence of the Engineer and Owner to verify the presence, appropriateness, and proper construction or installation of each being "checked out". Typical elements of the checkout include the following:
 - 1. Verify exterior areas for backfill, grading, surfacing, drainage, landscaping, roadways, fencing, and gates.
 - 2. Verify buildings for structure, masonry, architectural, mechanical systems, electrical/lighting, communications, and HVAC.
 - 3. Verify concrete structures for structural integrity, finish tolerance, durability, appearance, embedded and inserted items, painting and surface applications.
 - 4. Verify steel structures for member alignment, connection bolts torque, connection welds integrity, painting, fire proofing and surface applications.
 - 5. Verify mechanical systems and items for setting, alignment and securing, check and adjust packing and seals, lubrication, drying out, drive connection and alignment

including rotation and belt/chain tension, painting or surface applications, and tagging for project system.

6. Verify piping systems for material, size, components, direction, alignment of joints and bolts/welding, packing and seals, screens and filters and strainers, leak and pressure hydro tests, painting and color coding, hangers and anchors and expansion provision and supports, clean out of foreign matter and tagging for project system.
 7. Verify electrical and control/instrumentation systems for conduit and tray installation, wire/cable material and size, circuit continuity and identification, voltage testing, ground continuity and testing, terminal installation and identification, jar switches and circuit breakers and transformers tested, substation operation tested, and tagging for project system.
 8. Verify communication system including telephone, fire/smoke alarm, security, page/part, closed circuit TV similar to electrical above.
 9. Verify computer systems by station, function, and network interface.
- B. Each piece of equipment and system must be certified by the manufacturer's representative as specified in Section 01665 Services of Manufacturer's Representatives.
- C. Certifications shall not be completed until an Operation and Maintenance Manual has been submitted and approved.

1.06 FIELD TESTING OF EQUIPMENT

- A. When required by the technical specifications, perform field testing on installed equipment. Field testing shall be in addition to and not in lieu of, any shop testing either required or otherwise performed. Perform field testing as a part of the overall equipment and system testing process defined herein and in accordance with the approved checkout plan.
- B. Provide ninety days written notice indicating the date and time for testing one piece of equipment, or a series of equipment pieces. Submit with this notice the following for approval by the Engineer:
1. Description of the tests, specifically outlining how the test will prove conformance with the requirements in the technical specifications.
 2. Testing devices that will be used in the tests. Description shall state what portion of the tests that the devices will perform or measure, and device accuracy.
 3. Personnel used to perform the tests. Submit resumes, qualifications, and experience. As a minimum, personnel must have three years experience with the manufacturer and operation of the equipment to be tested and will have participated in five similar tests during this period of experience.
 4. Schedule of testing. Schedule shall include frequency of measurements, personnel present, and contingency plans for equipment and/or test failure.
 5. Test forms. Provide test forms for recording reporting on the field test data, prior to the test.
 6. Material and equipment required for the test. This material and equipment shall be supplied at no additional cost to the Owner.
 7. Water and Power Requirements. Water and power requirements shall be identified in the plan by the Contractor and will be supplied by the Contractor for field testing purposes. The Contractor shall provide all temporary piping and wiring required for field testing; and equipment and labor for the reuse of the test water. When testing is performed with water during freezing conditions, the Contractor shall take measures to prevent damage to the work caused by freezing of the water.

8. Operational Requirements. Include valve positions, set-ups, gate positions, including temporary arrangements that are required to run the tests so that the Owner can anticipate and plan for the testing situation.
 9. Provide seven days written notice to the Engineer prior to the actual start of any testing. This will include a statement by the Contractor that the equipment and facilities to be tested have been thoroughly inspected and cleaned of construction debris or other extraneous materials and all lubrication, materials, and preparations are completed.
- C. Field test procedures will be reviewed and returned by the Engineer within 30 days of receipt. Incorporate minor comments on the procedures, equipment, or personnel prior to testing. Major comments by the Engineer will require a resubmission of the field test procedure and proposed test date. The Contractor will be notified, in writing, by the Engineer if a formal resubmission is required with the transmittal of the review comments.
- D. Submit within one week after completion of the tests, the following to the Engineer for approval:
1. Completed test forms for each device tested.
 2. Completed certification documentation.
 3. A written summary of testing, reporting on the results and summarizing the entire procedure.
 4. A schedule for retesting, if necessary. Perform any retesting required to fulfill the intent of the technical specification test requirements at no additional cost to the Owner.

1.07 SYSTEM TESTING

- A. Specific system tests shall be performed by the general contractor in addition to the requirement for shop, field, and other tests called for in the technical specifications. System tests will be performed with fluid or gaseous substances that are generally non-septic, non-corrosive, non-toxic, and non-inflammable.
- B. Provide 30 days written notice indicating the date and time during which the specific functional test is proposed. Submit with this notice, the following to the Engineer for approval:
1. Testing devices that will be used in the tests. Description shall state what portion of the tests that the devices will perform or measure, and device accuracy.
 2. Personnel used to perform the tests. Submit resumes, qualifications, and experience. As a minimum, personnel must have three years experience with the manufacturer and operation of the equipment to be tested and will have participated in five similar tests during this period of experience.
 3. Schedule for Testing: Schedule shall include frequency of measurements, personnel present, and contingency plans for equipment and/or system test failure.
 4. Test forms. Provide test forms for recording reporting on the field test data, prior to the test.
 5. Material and equipment required for the test. This material and equipment shall be supplied at no additional cost to the Owner.
 6. Water and Power Requirements. Water and power requirements shall be identified in the plan by the Contractor and will be supplied by the Contractor for system testing purposes. The Contractor shall provide all temporary piping and wiring required for field testing; and equipment and labor for the reuse of the test water. When testing is performed with water during freezing conditions, the Contractor shall take measures to prevent damage to the work caused by freezing of the water.

7. Operational Requirements. Include valve positions, set-ups, and gate positions that are required to run the tests in the written request so that the Engineer can anticipate and plan for the testing.
 8. Provide seven days written notice to the Engineer prior to the actual start of any testing. This will include a statement by the Contractor that the equipment and facilities to be tested have been thoroughly inspected and cleaned of construction debris or other extraneous materials and all lubrication, materials, and preparations are completed.
- C. The Engineer, and the Owner may witness the performance of these tests, at their option.
- D. A review of the system test package by the Engineer will be made within two weeks of receiving the package. The Contractor shall incorporate minor comments on the procedures, equipment, and personnel prior to testing. Major comments by the Engineer will require a resubmission of the system test package and test date.
- E. Submit within one week after completion of the tests, the following to the Engineer for approval.
1. Completed test forms, for each device.
 2. Completed certification.
 3. A written summary of testing, reporting on the results and summarizing the entire procedure.
 4. A schedule for retesting, if necessary, including changes to procedures, testing devices, or personnel. Any retesting required to fulfill the intent of the test requirements due to negligence, poor workmanship, or products that fail to meet the contract requirements, shall be at no additional cost to the Owner.

1.08 CORRECTIONS TO THE WORK

- A. Correct any items of work failing to meet the specified requirements, at no additional cost to the Owner. Correct the nonconforming items by re-work, modification, or replacement, to the option of the Engineer. This includes the provision of all required labor, materials, and requirements for retesting as specified herein, to verify that the items conform with contract documents.

1.09 SAFETY

- A. Conduct all specified test procedures in compliance with all applicable safety standards and regulations.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

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SECTION 01700

CONTRACT CLOSE-OUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for specific administrative procedures, record keeping, close-out submittals, and forms used at substantial and final completion of the Work.
- B. Contractor shall satisfy all administrative requirements within the Contract Documents and the Requirements listed in this section prior to Contract Close-out.

1.02 FINAL CLEANING

- A. 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 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.
- B. The Contractor shall restore or replace, when and as directed, any public or private property damage 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 highway or 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 practicable as work progresses and shall not be left until the end of the contract period.
- C. Unless otherwise specified under the various Sections of the Specifications, the Contractor shall perform final cleaning operations as herein specified prior to final inspection.
- D. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.
- E. Cleaning shall include all surfaces, interior and exterior in which the Contractor and all Subcontractors have had access whether existing or new.
- F. Refer to Sections of the Specifications for cleaning of specific products or work.
- G. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
- H. Use only those cleaning materials and methods that are recommended by the manufacturer of surfaces material to be cleaned.
- I. Employ experienced workmen, or professional cleaners, for final cleaning operations.

1.03 PROJECT RECORD DOCUMENTS

- A. Project Record Documents also referred here as Record Drawings shall consist of all the contract drawings.
- B. The Contractor and all Subcontractors shall be required to maintain one set of Record Drawings, as the work relates to their Sections of the Specifications, at the site.
- C. Record Drawings shall be stored and maintained in the General Contractor's field office apart from other documents used for construction. The Record Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.
- D. Record Drawings shall be available at all time for inspection by the Engineer. All deficiencies noted shall be promptly corrected.
- E. The following information shall be indicated on the Record Drawings for building construction:
 - 1. Record all changes, including change orders, in the location, size, number, and type both horizontally and vertically of all elements of the projects which deviate from those indicated on all the contract drawings.
 - 2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the Record Drawings shall be plus or minus two (2) inches.
 - 3. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically at ten (10) ft. intervals and at all changes of direction.
 - 4. The location of all internal utilities and appurtenances, concealed by finish materials, including but not limited to valves, coils, dampers, vents, clean outs, strainers, pipes, junction boxes, turning vanes, variable and constant volume boxes, ducts, traps and maintenance devices. The location of these internal utilities, appurtenances and devices shall be shown by offsets to the column grid lines on the drawings.
 - 5. Each of the utilities and appurtenances shall be referenced by showing a tag number, area served and function on the Record Drawings.
 - 6. Prior to the installation of all finish materials, a review of the Record Drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as demonstrated by the Engineer.
- F. The following information shall be indicated on the Record Drawings for sewer construction:
 - 1. Location of manholes with 3 swing ties.
 - 2. Linear distance of sewer from manhole to manhole, including size and type of pipe.
 - 3. Manhole rim elevation and invert elevations of all pipes within manholes, including drops.
 - 4. Recalculated pipe slopes based on record elevations.
 - 5. Location in feet from downstream manhole of wyes and chimneys and vertical height of chimneys.
 - 6. Length of service connections.
 - 7. Location of service connection terminus (at property line) with 3 swing ties and depth from existing surface grade.
 - 8. Pumping station information as detailed in 1.03, E.
- G. The following information shall be indicated on the Record Drawings for water main construction:

1. Linear distance along watermain from appurtenance (i.e. vault to tee, tee to bends, bends to valves, blow offs and service corporations, including size and type of pipe.
 2. Depths of pipe and fittings.
 3. Location of vaults, valves, hydrants, bends, blow offs and service curb boxes with 3 swing ties.
 4. Rim elevation on vaults (meter, air release etc.).
- H. The following information shall be indicated on the Record Drawings for storm drain construction:
1. Rim elevations on inlets, catch basins, manholes and other structures.
 2. Invert elevations of all pipes within inlets, catch basins, manholes, end sections, headwalls, culverts and other structures.
 3. Linear distance along drain from structure to structure, and branch connections, including size and type of pipe.
 4. Recalculated pipe slopes based on record elevations.
 5. Location of manholes, inlets, catch basins, outlets, headwalls, other structures and service line connections with 3 swing ties.
- I. At the end of each month and before payment for materials installed, the Contractor, and his Subcontractors, shall review Record Drawings for purpose of payment. If the changes in location of all installed elements are not shown on the Record Drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.
- J. At the completion of the contract, each Subcontractor shall submit to the Contractor a complete set of his respective Record Drawings indicating all changes. After checking the above drawings, the Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the Record Drawings to the Engineer.

1.04 EQUIPMENT AND SYSTEM CHECKOUT, CERTIFICATIONS AND TESTING

- A. Comply with requirements of Section 01680 Equipment and System Checkout, Certifications and Testing.

1.05 OPERATING AND MAINTENANCE MANUALS

- A. Comply with requirements of Section 01730 Operation and Maintenance Manuals.

1.06 SPARE PARTS

- A. Comply with requirements of Section 01750 Spare Parts.

1.07 LUBRICANTS

- A. Comply with requirements of Section 01751 Lubricants.

1.08 WARRANTIES

- A. Comply with requirements of Section 01740 Warranties.

1.09 FINAL INSPECTION

A. The Contractor shall submit written certification that:

1. Project has been inspected for compliance with Contract Documents.
2. Equipment and systems have been tested in the presence of the manufacturer's representative and are operational and satisfactory.
3. Project is completed, and ready for final inspection.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01710

STARTUP

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Startup requirements for processes, equipment and components, and the roles and responsibilities of the Contractor and the Owner.

1.02 DEFINITIONS

- A. Startup: The initial operation of a sufficiently completed facility and/or plant by the Owner, utilizing wastewater and related substances (sludge, wastewater, scum), or other media, which the facility has been designed to process.

1.03 DESCRIPTION OF WORK

- A. The primary responsibility for startup rests with the Contractor with assistance from the Owner as specified herein.
- B. The Contractor shall not operate any of the existing facilities at any time. This shall include the starting and stopping of equipment or opening and closing of valves. Whenever the Contractor believe his work will effect or be effected by the existing facilities operation he shall so notify the Engineer in writing three (3) working days prior to the intended start of the work. This notification shall clearly detail the work to be completed, the method by which the existing facilities operation may be effected and the assistance requested of the Owner.
- C. At the discretion of the Engineer, individual startups may be required for various phases of the work. If this occurs, the phase startups will be ordered by the Engineer when the following has been completed for all equipment and systems within each Phase. The Engineer may order the startups prior to the completion of non-essential items of work.
 - 1. Compliance with Section 01665 Services of Manufacturer's Representatives, including:
 - a. Supervision of Installation
 - b. Equipment Checkout
 - c. Field Testing of Equipment
 - d. Pre-Startup Operator Training
 - 2. Compliance with requirements of Section 01680 Equipment and System Checkout, Certifications and Testing
 - 3. Compliance with requirements of Section 01730 Operation and Maintenance Manuals
 - 4. Compliance with requirements of Section 01750 Spare Parts
 - 5. Compliance with requirements of Section 01751 Lubricants
- D. The Contractor shall be responsible for maintaining all equipment until the dates of substantial completion.
- E. The Contractor shall assist the Owner during startup in any way deemed appropriate by the Engineer.

- F. There will be a date of substantial completion certified by the Engineer for each Phase of construction. These dates will not be certified until the following requirements have been satisfied by the Contractor:
1. All Contract requirements are coordinated into a fully operational system. All individual units of equipment and treatment processes are fully operative and performing at specified efficiencies. Where efficiencies are not specified, performance must meet acceptable standards for the particular unit.
 2. All field tests have been completed and satisfactory reports forwarded to the Engineer.
 3. All pre-startup training has been completed by the manufacturer's representatives.
 4. All spare parts and lubricants have been satisfactorily delivered to the Owner.

1.04 ROLES AND RESPONSIBILITIES

A. Contractor's Responsibilities

1. Startup
 - a. Develop specific startup plans and schedule.
 - b. Provide specific startup material and operating supplies until substantial completion or until acceptance of a specific system. Supplies include lubricants, chemicals, gases, specialized fluids, electric power, water (City and non-potable process water) and all other required appurtenances.
 - c. Provide the necessary craft or labor assistance, in the event of an emergency equipment failure requiring immediate attention, (emergency is defined as a failure of function which precludes the further operation of a critical segment of; or the whole of the work) with a response time of not less than four hours from the time of notification. The time of notification is defined as the time of contact between the Engineer's representative and the Contractor's representative.
 - d. Clarify submittals, testing requirements, schedules, or other items related to the startup of the equipment and facilities specified and indicated in the Contract Documents.
 - e. Correct all failures or equipment problems identified during startup when notified by the Engineer.
 - f. Attend meetings related to the review of startup plan(s).
2. Performance Testing (where specified in individual technical specifications Sections 11 through 16).
 - a. Review procedures for performance testing.
 - b. Provide manufacturer's representative to provide guidance during performance testing.
 - c. Provide manufacturer's representatives and operating supplies for retesting of systems that fail to pass the initial performance tests due to deficiencies in products or workmanship at no additional cost to the Owner.
 - d. Resolve and correct all equipment or system failures during the performance testing.
3. Provide to the Engineer a list of 24 hour, "on call" representative supervisory persons who will monitor the startup and performance testing.

B. Owner's Responsibilities

1. Assist in the startup testing activities. The Owner will endeavor to be cooperative with the Contractor when required. However, it is emphasized that the existing facilities operations and treatment take precedence and only requests that do not adversely affect the flow or treatment will be considered. Additionally, any assistance given to the Contractor must be completed when the Owner's schedule and manpower permit. There

may be instances when the Owner cannot provide assistance at the time of the Contractor's request and this shall not be the basis for a claim by the Contractor.

2. Provide staff to operate and maintain equipment, systems, and facilities requiring startup.

1.05 SUBMITTALS

A. Specific Startup Plans and schedule for all phases of startup.

B. List of 24-hour "on call" representative supervisory persons.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

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SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for compiling and submitting operation and maintenance manuals.

1.02 OPERATION AND MAINTENANCE MANUALS

A. General

1. Include all elements and components of the system including instrumentation. Provide a description of how the equipment or complete system works. Additionally, where a number of components are furnished to provide a complete system, describe the operation of components as they relate to the complete system.
2. Include all necessary instruction for the maintenance and operation of the equipment or system in accordance with the manufacturer's recommendations, and as herein specified.
3. Customize the manual so that only data pertaining to the specific equipment or system to be furnished is included. If a standard type manual is utilized, it shall be neatly annotated to highlight the data pertaining to, and deleting the data not pertaining to, the specific equipment or equipment being furnished.
4. Bind each manual for each type of equipment or system separately as specified below

B. Content of Manuals

1. Table of Contents and index. Provide title of Contract and schedule of products and systems, indexed to content of the volume.
2. Brief description of each system and components. Identify function, normal operating characteristics and limiting conditions. Include performance curves, with engineering data and tests. Include equipment Nameplate Data (Serial No., Model No., rating, voltage, etc.).
3. Names, addresses, and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
4. One copy of each approved shop drawing and each Contractor's coordination and layout drawing
5. Record drawings of wiring diagrams and control schematics including external connection diagrams.
6. Test and balancing reports, calibration data, alignment records, and other information.
7. Copy of any applicable warranties, guarantees and bonds
8. Operating Procedures:
 - a. Include start-up, break-in, and routine normal operating instructions and sequence. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
 - b. Manufacturer's printed operating instructions.
9. Maintenance Procedures:
 - a. Complete maintenance instructions (include routine, preventive and corrective maintenance).
 - b. Manufacturer's printed maintenance instructions, parts list, illustrations, and diagrams.

- c. Include maintenance schedule and types of lubricants. Cross-reference lubricants to products offered by at least three major lubricant suppliers.
10. Spare Parts:
- a. List of recommended spare parts, manufacturer's current price, and recommended quantity
 - b. Parts lists to include the specific part or identification number used by the manufacturer of the parts. Arbitrary sequential numbers or letters keyed to a sectional diagram are not satisfactory.
11. Additional Requirements: As specified in individual product specification sections.
- C. Format
- 1. PDF
 - a. PDF file for each piece of equipment or system shall be provided
 - b. File shall have complete Table of Contents with each section book marked
 - c. Each section shall have a cover sheet
 - 2. Binder
 - a. Binders: Commercial quality, 8-1/2 x 11 inch three-ring binders with hardback, cleanable, plastic covers; two inch maximum ring size. When multiple binders are used, correlate data into related, consistent groupings. Provide a table of contents in each binder.
 - b. All binders to be of similar design and color, but sized to suit the individual manuals with a minimum allowable edge of width of 1 inch.
 - c. Identify each manual with a permanent label affixed to the outside binding of the binder and include the following information:
 - 1) Name of Contract, Contract Number
 - 2) Location of equipment or system (i.e. Primary Settling Tanks)
 - 3) Common name of equipment or system (i.e. Chain and Flight Sludge Collectors)
 - d. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
 - 3. Material for Content
 - a. Loose leaf on 60 pound, punched paper
 - b. Holes reinforced with plastic cloth or metal
 - c. Page size, 8 1/2 by 11 inches
 - d. Diagrams, illustrations, and attached foldouts as required, of original quality, reproduced by dry copy method
 - e. Drawings: Provide with reinforced punched, binder tab. Bind in with text; fold larger drawings to size of text pages

1.03 SUBMITTALS

- A. Sample of typical binder, cover and tabbed fly leaf.
- B. Provide three (3) hard copies and one (1) electronic copy of O&M manuals for approval no later than the time that the equipment is delivered to the site. If the manual is satisfactory, the Engineer will retain all three (3) copies. If the manual is not satisfactory, the Engineer will retain one (1) copy and return two (2) copies to the Contractor. When manuals are resubmitted, three (3) copies will again be required. When the manual is satisfactory, except for some missing information, the Engineer may, at his option, retain all three (3) copies of the manual and request three (3) copies of the additional information to be provided.

- C. All manuals pertaining to equipment or a system within each specific components of construction must be completely approved prior to the Field Acceptance Tests of that component.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

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SECTION 01740

WARRANTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1.02 SUBMITTAL

- 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 date for warranties other than a date of Substantial Completion for the Work, or a designed 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 prior to acceptance of this portion of the Work.
- C. Refer to individual Sections of Division 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

1.03 WARRANTY REQUIREMENT

- A. Related Damages and Losses: When correcting warranted Work 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 warranted Work.
- 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. 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.

1.04 DEFINITIONS

- A. Standard Product Warranties are preprinted 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 01750

SPARE PARTS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Spare parts which are identical and interchangeable with original parts shall be provided with equipment as specified in each Section of the Specifications. Spare parts shall be individually packaged in boxes bearing the equipment reference, tag number, and part identification (Example: Sewage Pump No. 1).
- B. Subsequent to the approval of the appropriate operation and maintenance manuals but prior to the delivery of the spare parts, the Contractor shall prepare and submit an itemized tabulation of all spare parts to be provided. The tabulation shall include the name of the equipment for which the spare part is intended, type of spare part, manufacturer of spare part, manufacturer model or manufacturer identification number of spare part, quantity of spare part, and page in the appropriate operation and maintenance manual detailing the parts list.
- C. Spare parts shall be stored by the Contractor in a location approved by the Engineer. Unless otherwise directed by the Engineer, the Contractor shall deliver the spare parts to the Owner at the time of "Substantial Completion." Spare parts shall be stored in accordance with the manufacturer's written recommendations, and shall be protected against theft, vandalism, weather, and all other adverse conditions. Spare parts delivered to the Owner shall be in new, undamaged condition. Upon delivery to the Owner, spare parts shall be logged in against the above noted tabulation and inspected by the Contractor in the presence of the Engineer. Any missing or damaged spare parts shall be replaced by the Contractor at no expense to the Owner.

1.02 SPECIAL TOOLS

- A. Provide special tools required for operation, service, or maintenance of the products as specified or as needed, as determined by the manufacturer's representative.
- B. Pack items to protect them during storage. Tag items and containers to clearly identify them.

1.03 CONTRACT SPECIFIC REQUIREMENTS

- A. Specific requirements for spare parts for this contract are included in the technical specifications.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01751

LUBRICANTS

PART 1 GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall furnish and deliver to the Owner such oil, grease and any special lubricants that are necessary for proper operation of all equipment furnished under this contract. The quantity furnished shall be sufficient for one year's operation after the date of substantial completion. The grade of lubricants furnished shall be in accordance with the recommendations of the equipment manufacturers.
- B. Subsequent to the approval of the appropriate operation and maintenance manuals but prior to the delivery of the lubricants, the contractor shall prepare and submit an itemized tabulation of all lubricants to be provided. The tabulation shall include the name of the equipment for which the lubricant is intended, its tag number, type of lubricant, manufacturer of lubricant, frequency of lubrication, quantity of lubricant required for one year, and page in the appropriate operation and maintenance manual referencing the lubricant.
- C. All lubricants shall be delivered to the Owner prior to the start-up of the equipment. They shall be delivered in the manufacturer's unopened containers and shall be labeled with the equipment name for which it is to be used. At the time of delivery they shall be logged in against the above noted tabulation and inspected by the Contractor in the presence of the Engineer.
- D. The Contractor shall also furnish and deliver to the Engineer such grease guns and auxiliary lubricating devices as are required to conveniently maintain all equipment furnished. As a minimum, one grease gun and accessories will be furnished for each individual item of equipment requiring lubrication.
- E. Prior to substantial completion, the Contractor shall submit an "Equivalent Lubrication Table" which shall list equivalent products from at least four major oil companies for all lubricants that will be required for all the equipment provided under this Contract.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

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SECTION 01800

MAINTENANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for maintaining work completed under this Contract.

1.02 MAINTENANCE PERIOD

- A. The general maintenance period for all construction or materials under this Contract shall be one (1) year subsequent to the date of the acceptance of the work by the Owner, or as provided by other sections of this Specification.
- B. If the Owner puts any structure or equipment to use prior to acceptance of all work under the Contract, the maintenance period for such structures or equipment shall be calculated from the time use begins.
- C. Contractor agrees to replace the material which does not conform to the Contract requirements, and to repair any damage of material or work without cost to the Owner, to satisfaction of Engineer, in conformance with Contract Documents provided orders for replacement and/or repairs are received in writing by the Contractor within the one year period.
- D. This Section shall in no way limit the duration of the Contractor's responsibility for the correction of any defect due to workmanship or materials provided by the Contractor which are not in compliance with the Contract Documents.

1.03 ABUSE OF WORK

- A. Contractor is not obligated to perform work of replacement or repair that he may prove is required because of abuse by parties other than the Contractor, after the date the Owner puts to continuous use the work requiring replacements or repair, or after date the Owner has approved the Certificate of Completion.

1.04 EMERGENCY REPAIRS

- A. If the Owner deems necessary, the Owner shall order replacement or repairs be undertaken within 24 hours.
- B. If the Contractor delays or fails to make the ordered replacement or repairs within the time specified, the Owner shall have the right to make such replacements or repairs and the expense shall be deducted from moneys due the Contractor, or moneys of the Contractor retained by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01810

MAINTENANCE OF PLANT OPERATION AND SEQUENCE OF CONSTRUCTION

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. The existing wastewater pumping stations will be maintained in continuous operation by Veolia. The Contractor shall provide, operate, and maintain temporary pumping facilities for as long as required to complete the work. The Contractor shall schedule his operations to conform with the requirements specified herein, and shall include in his construction progress schedule all events which will impact operation of the existing pumping stations.
- B. The Contractor shall at all times conduct his operations so as to interfere as little as possible with existing works. The Contractor shall develop a program, in cooperation with the Engineer and interested officials, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations there from are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time and when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. Before starting work which will interfere with the operation of existing facilities, the Contractor shall perform all preparatory work and shall see that all labor, tools, materials, and equipment are made ready and at hand.
- C. The Contractor shall make minor modifications in the work relating to existing structures as may be necessary to satisfactorily complete the work, without additional compensation.
- D. All costs associated with maintaining existing flows and pumping station operations, including providing, maintaining, operating, and removal of all equipment and required appurtenances, shall be considered part of the work being constructed. It being understood and agreed to by the Contractor that the cost to complete the work shall constitute full and complete compensation to the Contractor for providing all provisions necessary and/or required for maintaining flow during construction.
- E. Any approved construction activity which will affect the operation of the influent sewers, or pumping capability of the facility, shall be done, unless otherwise approved by the Engineer, during low influent flow periods. Low influent flow periods are defined as early weekday and weekend mornings (between MIDNIGHT and 7 A.M.), during dry weather periods only. The Contractor may request to work on the existing facilities at such times and shall only proceed with full approval from the City and the Engineer.

1.02 RELATED WORK

- A. Section 01010 - Summary of Work
- B. Section 01015 – Special Conditions
- C. Section 01300 - Submittals
- D. Section 01310 - Construction Progress Schedule
- E. Section 01510 - Temporary Utilities

- F. Section 01665 – Services of Manufacturer’s Representatives
- G. Section 01680 – Equipment Checkout, Certifications and Testing
- H. Section 01710 – Start-up
- I. Section 01810 – Maintaining Existing Flow
- J. Section 02050 - Demolition

1.03 SUBMITTALS

- A. Submit, in accordance with the provisions of Section 01300, complete descriptions of procedures to maintain facility operation to supplement the construction progress schedule developed in accordance with Section 01310. The description shall include step-by-step procedures, required duration, and specific procedures required to be performed by the Owner's personnel.

1.04 CONTRACTOR'S AND OWNER'S RESPONSIBILITIES AND LIMITATIONS

- A. The Contractor's construction activities shall not disrupt operation of the existing pumping station, nor the influent sewers, no matter how minor, without the approval of Plant operations personnel, the Engineer and Owner.
- B. The Contractor shall not operate or utilize any existing plant facilities. This includes the starting and stopping of equipment, the opening and closing of valves or the use of existing piping. Whenever the construction work requires action by the Owner, the Contractor shall so notify the Engineer as described below.
- C. The Contractor shall notify the Engineer in writing of any construction activity that will affect facility operations or require assistance from the Owner in operating any existing facilities. This notification shall be received at least one week prior to the planned construction work. The request shall clearly detail the Contractor's planned work, how his work will affect the operation of the existing facilities, the estimated duration of the work, and any assistance required of the Owner. The Contractor's request shall also explain why other construction methods, which may have less of an impact on treatment operations, are not feasible.
- D. It is emphasized that the operations of the existing facilities take precedence over all construction activities. Denials of requests from the Contractor for the Owner's assistance in modifying his plant operations shall not be a basis for any claim by the Contractor. Any approved assistance given to the Contractor from the Owner will be provided when the Owner's schedule and manpower permit. The Contractor shall also provide access for the Owner's personnel to all existing facilities at all times throughout the construction period.

1.05 SEQUENCE OF CONSTRUCTION

- A. The detailed schedule for construction shall be based upon the schedule submitted by the Contractor and approved by the Engineer as specified above. However, as a guide for the Contractor in the preparation of his schedule, scheduling requirements are described below for specific portions of the work.
- B. The order of construction shall be subject to the approval of the Engineer; such approval or direction, however, shall in no way relieve the Contractor's responsibility to perform the work in strict accordance with the Contract Documents. The construction plans and specifications have been developed to minimize the construction impacts on the operation of the Pumping

Station, influent sewers and discharge force mains. The Contractor shall note the requirements of Section 01010 with regard to the operation of the pumping station and the phasing of construction when developing his work sequence. The Contractor's work sequence must be specifically detailed in the CPM which is required under Section 01310.

- C. Whenever the Contractor's proposed work will require the Owner to deviate from the normal operation of the plant, the Contractor shall so notify the Engineer in writing. Such notification shall be submitted one week prior to the planned construction activity and shall include all information as described in Section 01010.
- D. Contractor should note that other construction activities being performed under separate contracts will be underway at the time this contract is awarded. Contractor shall coordinate activities, as required, to minimize conflicts with other construction activities being performed on the property.
- E. Suggested sequences of construction for various work items are presented below. Note that these are only general suggested sequences of construction. The Contractor may wish, or may find it necessary, to alter the sequence of construction. All necessary details and items of work are not purported to be included.
- F. Following equipment checkout, certification and testing of instrumentation and control system, electrical equipment and mechanical equipment, the new station shall be operated in fully automatic mode for a minimum of three consecutive days, during the work week and within normal business hours, without interruption and without faulty alarm conditions, prior to acceptance. Wastewater shall be redirected to old station and returned to operation of the old system at the end of each day during this test period. Once approved by the Owner, the new station may be put on-line full time and rehabilitation work within the existing station may begin.

Davis Street Pump Station:

Existing pumping station will remain on bypass throughout construction and start-up of new equipment.

- 1. Establish sediment & erosion controls and site security.
- 2. Bypass System
 - a. Utilize pumper truck to manage flow while installing bypass connection.
 - b. Drain force main and install bypass connection.
 - c. Set up temporary bypass pumping system.
 - d. Operate bypass pumping for a minimum of two (2) working days uninterrupted prior to starting demolition of existing electrical equipment.
- 3. Demolition of existing electrical equipment
- 4. Electrical Work
 - a. Electrical work and generator installation
- 5. Start-up & test new equipment
 - a. Operate equipment in AUTOMATIC mode for a minimum of seven (7) days uninterrupted. Bypass pumps to remain in place until start-up of new equipment is complete
- 6. Following testing of new equipment, and upon approval from the Engineer, remove the temporary bypass setup
- 7. Complete site restoration

Industrial Park Pump Station:

Existing pumping station will remain on bypass throughout construction and start-up of new equipment.

1. Establish sediment & erosion controls and site security.
2. Bypass System
 - a. Set up temporary bypass system utilizing existing bypass connections.
 - b. Operate bypass pumping for a minimum of two (2) working days uninterrupted prior to starting demolition of existing electrical equipment.
3. Electrical Work
 - a. Demolition of electrical equipment
 - b. Installation of generator and associated electrical work
4. Start-up & test new equipment
 - a. Bypass pumps to remain in place until start-up of new equipment improvements is complete.
5. Following testing of new equipment, and upon approval from the Engineer, remove the temporary bypass setup
6. Complete site restoration

Myles Standish Blvd Pump Station:

Existing pumping station will remain on bypass throughout construction and start-up of new station.

1. Conduct coordination meeting on site with TMLP prior to any site work.
2. Establish sediment & erosion controls and site security.
3. Bypass System
 - a. Utilize pumper truck to manage flow while installing bypass connection.
 - b. Drain force main and install bypass connection.
 - c. Set up temporary bypass pumping system.
 - d. Operate bypass pumping for a minimum of two (2) days uninterrupted prior to starting demolition of existing electrical equipment.
4. Install temporary power for streetlights and signalized intersection.
5. Conduct test pits as required.
6. Install new duct banks, handholes, and transformer pad as shown. Coordinate with TMLP to move existing transformer to new location.
7. Demolition of existing pump station (wet and dry wells)
8. Construction of new pump station
9. Start-up & test new station
 - a. Operate new pumps in AUTOMATIC mode for a minimum of seven (7) days uninterrupted. Bypass pumps to remain in place until start-up of new station is complete
10. Following testing of new station, and upon approval from the Engineer, remove the temporary bypass setup
11. Complete site restoration

Partridge Circle Pump Station:

1. Establish sediment & erosion controls and site security.
2. Provide pump trucks and temporary bypass pumps as required to complete the proposed work.
3. Demolition of existing submersible pumps and associated electrical equipment
4. Install new submersible pumps and pump guide rails and associated electrical equipment
5. Start-up & test new equipment
 - a. Operate new pumps in AUTOMATIC mode for a minimum of seven (7) days uninterrupted. Bypass pumps to remain in place until start-up of new equipment is complete
6. Following testing of new equipment, and upon approval from the Engineer, remove the temporary bypass setup
7. Complete site restoration

School Street Pump Station:

Existing pumping equipment will remain on bypass throughout construction and start-up of new equipment.

1. Establish sediment & erosion controls and site security.
2. Bypass System
 - a. Set up temporary bypass system utilizing existing bypass connections in the valve pit.
 - b. Install temporary bypass pumping system.
 - c. Operate bypass pumping for a minimum of two (2) days uninterrupted prior to starting demolition of existing electrical equipment.
3. Demolition of existing electrical equipment
4. Electrical Work
 - a. Installation of generator and associated electrical work
5. Start-up & test new equipment
 - a. Bypass pumps to remain in place until start-up of new equipment is complete
6. Following testing of new equipment, and upon approval from the Engineer, remove the temporary bypass setup
7. Complete site restoration

Stevens Street Pump Station:

Existing pumping equipment will remain on bypass throughout construction and start-up of new equipment.

1. Establish sediment & erosion controls and site security.
2. Bypass System
 - a. Set up temporary bypass system utilizing existing above ground piping in the building.
 - b. Install temporary bypass pumping system.
 - c. Operate bypass pumping for a minimum of two (2) days uninterrupted prior to starting demolition of existing electrical equipment.
3. Electrical Work
 - a. Installation of generator and associated electrical work
4. Start-up & test new equipment
 - a. Bypass pumps to remain in place until start-up of new equipment is complete
5. Following testing of new equipment, and upon approval from the Engineer, remove the temporary bypass setup
6. Complete site restoration

Wellesley Circle Pump Station:

Existing pumping equipment will remain on bypass throughout construction and start-up of new equipment.

1. Establish sediment & erosion controls and site security.
2. Conduct test pits as required.
3. Bypass System
 - a. Utilize pumper truck to manage flow while installing bypass connection.
 - b. Drain force main and install bypass connection.
 - c. Set up temporary bypass pumping system.
 - d. Operate bypass pumping for a minimum of two (2) days uninterrupted prior to starting demolition of existing equipment.
- 4. The bypass pumping system is to be utilized during non-work hours.**
- 5. During working hours while completing wet well modifications wastewater flow will be managed with a sewer pump truck.** Contractor to install inflatable plugs to isolate the pump station from active flow. Pumped wastewater to be discharged to the force main discharge manhole on Cullen Street. Contractor to notify homeowners to limit water use during use of pumper trucks. Contractor to anticipate having to clean wet well each time flow is reintroduced into wet well to allow installation of new work in clean conditions.
6. Demolition of existing structures and equipment
7. Installation of new structures and equipment
8. Start-up & test new equipment
 - a. Operate new pumps in AUTOMATIC mode for a minimum of seven (7) days uninterrupted. Bypass pumps to remain in place until start-up of new equipment is complete
9. Following testing of new equipment, and upon approval from the Engineer, remove the temporary bypass setup
10. Complete site restoration

END OF SECTION

DIVISION 02

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SECTION 02050

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes requirements for demolition of existing facilities and removal of equipment and materials for reuse or salvage.
- B. Items scheduled for demolition are shown on the Contract Drawings.
- C. Items or areas scheduled for partial or selective demolition are shown on the Contract Drawings.

1.02 SUBMITTALS

- A. Shop Drawings
 - 1. In accordance with Specification Section 01300.
- B. Quality Assurance/Control Submittals
 - 1. Methods of demolition and equipment proposed for use in demolition.
 - 2. Copies of Permits required for demolition. See Section 01060.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Utilities
 - 1. Notify Owner to turn off affected services prior to demolition.
 - 2. Remove utilities to be abandoned as a result of demolition.
 - 3. Seal water, sewer, drainage and gas utilities and services as shown on Contract Drawings using plugs, caps or seals as needed.
 - 4. Temporary Sewer Bypass system shall be installed, started up and tested prior to any demolition work.
- B. Equipment Salvage and Reuse

1. Do not remove equipment or materials without approval of Engineer.
2. Properly store and maintain equipment and materials to be reused in the Work.

3.02 SEQUENCE

- A. See Section 01810 Maintenance of Plan Operation and Sequence of Construction.

3.03 SAFETY

- A. Protect persons and property throughout progress of work.
- B. Have acceptable fire extinguishers available at all times where demolition by burning torches is being conducted.
- C. Burning of demolition debris not permitted on or near site.
- D. Explosives not to be used or brought to site without prior written permission by Engineer.
- E. Maintain circulation of traffic within area of demolition operations.
- F. Provide and maintain lights, barriers and temporary passageways for safe access within area of demolition operation.
- G. Take precautions to minimize spread of dust and flying particles. Keep work area wet down to prevent dust from rising.
- H. Provide maximum practical protection from inclement weather to materials, equipment and personnel in partially dismantled structures.

3.04 DEMOLITION

- A. Dismantle and remove existing piping, tanks, pumps, motors, equipment and other appurtenances indicated without damaging existing structures, equipment and appurtenances to remain.
- B. Confine demolition work, new construction and operations to areas that will not interfere with continued use and operation of entire plant.
- C. Floors and/or roofs shall not be overloaded. Complete demolition on upper levels before disturbing supporting members on lower levels. Provide shoring and bracing where necessary to prevent settlement or displacement of existing or new structures.
- D. All existing instrumentation not scheduled for demolition or alterations to remain where located and in operation, including instruments which relate to new monitoring or control loops unless otherwise indicated or specified.
- E. Electrical equipment, conduit, wiring, etc. to be removed as indicated, as specified under appropriate sections of Division 16 - ELECTRICAL.

F. On exposed surfaces, where there will be in the finish work a joint between old and new concrete, the existing concrete at the face shall be removed to a straight rather than a rough line.

G. Piping

1. Remove piping to be abandoned as indicated, specified and directed by Engineer or if it interferes with new work.
2. Remove to nearest solid support, cap and leave in place piping not indicated to be removed or interfering with new work.
3. Piping to be removed which passes through an existing wall shall be cut off and properly capped on each side of the wall.
4. Underground piping to be abandoned and remain shall be properly capped unless it interferes with new structures or as indicated, specified and directed by Engineer.

3.05 REPAIR/RESTORATION

- A. Repair or remove and replace items not scheduled for demolition damaged by Contractors operations to original condition as directed by Engineer.
- B. The Contractor shall exercise extreme caution when removing sections of concrete from slabs or walls that are to be utilized as part of the new construction. Demolition shall be to the exact limits indicated on the Drawings. Over-excavated concrete shall be replaced at the Contractor's expense and to the satisfaction of the Engineer. Any damage to the remaining structure caused by the Contractor's operations shall be satisfactorily repaired at the Contractor's expense.

3.06 DISPOSAL

- A. The contractor shall provide a disposal plan for approval by the Owner and Engineer. Contractor shall provide all receipts, bills of lading, manifests and other applicable documentation for any offsite disposal.
- B. All mechanical equipment, including interior piping, valves and other appurtenances indicated on the drawings or specified and directed by Engineer to be demolished or removed will be removed from the property of the Owner immediately after disassembly and will become the property of the Contractor. The Owner reserves the right to remove any equipment or piping prior to signing of the agreement.
- C. Debris from structures, including concrete, masonry, steel or other rubble shall become the property of the Contractor, unless otherwise directed by the Engineer, and shall be promptly removed from site at the Contractor's expense.

3.07 CLEANING

- A. Leave affected areas of demolition in a clean, safe and orderly condition, ready to accept new work if proposed.

END OF SECTION

SECTION 02080

MANAGEMENT OF CONTAMINATED MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for disposal of surplus materials generated from the construction of the wastewater pumping station improvements.
2. Three categories of soil disposal have been identified for disposal of Excess Soil:
 - Re-Use Facility: defined as soil or materials containing concentrations of contaminants less than the acceptance criteria at a soil Re-Use facility based on the Contractor's laboratory analytical results.
 - In-State Landfill: defined as soil or materials containing concentrations of contaminants greater than the acceptance criteria at a soil Re-Use facility and less than the Massachusetts Department of Environmental Protection's COMM-97 acceptance criteria based on the Contractor's laboratory analytical results.
 - Out-of-State Landfill: defined as soil or materials containing concentrations of contaminants greater than the COMM-97 acceptance criteria based on the Contractor's laboratory analytical results.
3. Requirements for identifying, handling, stockpiling, and disposal of excess soil and groundwater.

B. Related Sections

1. Section 01025 – Measurement and Payment
2. Section 01069 - Health and Safety Requirements
3. Section 01300 – Submittals
4. Section 02140 – Dewatering
5. Section 02200 – Earth Excavation, Backfill, Fill and Grading

1.02 WORK INCLUDED

A. In general, work under this Section shall include all labor, materials, equipment, supervision and supplies necessary for the loading, handling, transportation, and off-site disposal of Excess soil and all labor, materials, equipment, supervision and supplies necessary for the loading, handling, and transportation soil as directed by the ENGINEER.

B. Excess Soil generated from excavation activities, shall be managed as follows:

1. Securing permits and licenses, as necessary, including notification of local emergency personnel and notification/reporting requirements, with respect to unforeseen conditions;

2. Mobilization and demobilization of personnel, equipment, materials and supplies required to perform the Work;
3. Excavation, loading and hauling Excess Soil to stockpile area and Management of Stockpile at 100 Arlington Street. Identifying and coordination with Licensed Disposal/Reuse Facility; loading and hauling stockpiled material for disposal at a disposal/Reuse facility approved by the Engineer; and all fees associated with Excess Soil disposal. Segregating boulders and other large rocks for off-site management, as directed by the ENGINEER;
4. To the extent practical, removing and segregating asphalt from the soil; and
5. General site cleanup.

1.03 SAMPLING

- A. The CONTRACTOR will be responsible for **all costs** associated with sampling and analyses as may be required by the receiving disposal facility(ies) for off-site disposal of soil. **All Excess Soil must be sampled by the CONTRACTOR for management and offsite disposal.** Any such sampling services shall be completed by Contractor after stockpiling and as quickly as possible. Contractor shall schedule his/her activities to allow for sampling to be performed, analytical results to be compiled and management decisions to be made.
- B. The CONTRACTOR will provide ENGINEER with 48 hours notice of sampling activities. ENGINEER will be present during all sampling activities.
- C. Samples collected and/or tested by the CONTRACTOR without coordinating with the ENGINEER shall be for his own convenience only, and shall not be the basis for classification, determination of limits, or payment.

1.04 LICENSED SITE PROFESSIONAL (LSP) SERVICES

- A. Licensed Site Professional (LSP) services to be provided by the ENGINEER, include Massachusetts Department of Environmental Protection (MassDEP) response actions, preparing Massachusetts Contingency Plan (MCP) related filings including but not limited to Utility-related Abatement Measure (URAM) Plans, Release Abatement Measure (RAM) plans, Material Shipping Records, and Bills of Lading.
- B. The CONTRACTOR shall retain the services of an LSP for preparation of the soil management plan, preparation of soil disposal applications, sampling of stockpiled soil for soil management, and providing sampling data summaries. ENGINEER's LSP will be provided draft documents for review prior to submittal.

1.05 APPLICABLE LAWS AND REGULATIONS

- A. The CONTRACTOR is advised that Work under this Section may need to be performed under the requirements of 310 CMR 40.0000 et seq., also known as the Massachusetts Contingency Plan (MCP).

- B. Work under this Section shall be performed in strict compliance with applicable Federal, State and local laws, rules, regulations related to the handling and off-site management of contaminated wastes and regulated soil.
- C. Pertinent Federal and State Authorities having jurisdiction over this project include:
 - 1. Occupational Safety and Health Administration (OSHA)
 - 2. U.S. Environmental Protection Agency (EPA)
 - 3. Massachusetts Department of Environmental Protection (MassDEP)
- D. The following OSHA regulations will apply:
 - 1. Occupational Safety and Health Standards, Hazardous Waste Operations and Emergency Response - 29 CFR 1910.120.
 - 2. Safety and Health Regulations for Construction - 29 CFR 1926.

1.06 SUBMITTALS

- A. Submittals shall be made in compliance with the requirements of Section 01300 except as provided for herein.
- B. No Work will be permitted to proceed until the required submittals have been received and approved by the ENGINEER. In the event the ENGINEER requests additional information, it shall be the CONTRACTOR's responsibility to provide such additional information in a complete and timely manner, so that construction can proceed by the date stipulated in the Notice to Proceed.
- C. Contaminated soil will be encountered during the work. Prior to the commencement of work, the CONTRACTOR shall submit the following to the ENGINEER for approval:
 - 1. Submittal of required certifications demonstrating that personnel are properly trained and qualified to perform the Work in accordance with applicable OSHA regulations and laws governing the Work.
 - 2. Names and qualifications of proposed subcontractors, if any, identifying the tasks to be performed by each proposed Subcontractor.
 - 3. A Proposed Soil Management Plan, including a description of the proposed equipment and decontamination procedures; identification of staging areas for the loading of the Excess and Contaminated soil; stockpiling setup and procedures; loading and transportation procedures for off-site disposal; and project schedule. The plan should also identify disposal facilities for the Excess Soil.
 - 4. The CONTRACTOR's Site-Specific Health & Safety Plan pursuant to OSHA 1910.120 requirements.
- D. Approval of submittals by the ENGINEER shall not impose any liability upon the ENGINEER, nor shall any such approval relieve the CONTRACTOR of his/her

responsibilities to meet the requirements and comply with applicable laws, regulations and other applicable requirements under this Contract.

1.07 EXISTING ENVIRONMENTAL CONDITIONS

- A. The CONTRACTOR shall satisfy himself/herself as to the conditions existing at the Site, the type of equipment required to perform this Work, and the quality and quantity of the materials to be removed.
- B. Failure of the CONTRACTOR to become fully acquainted with the available information will not relieve him/her of the responsibility to completely and properly perform the work in full compliance with the Contract Documents. The ENGINEER assumes no responsibility for any conclusion or interpretation made by the CONTRACTOR on the basis of information made available by the Owner or ENGINEER.

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION

3.01 GENERAL

- A. The CONTRACTOR will provide adequate barriers and demarcation of excavations and exclusion zones to warn site visitors and the public of potential hazards.
- B. The CONTRACTOR will take appropriate means to prevent a release or the spread of hazardous wastes or contaminated materials as a result of the CONTRACTOR's operations.
- C. The CONTRACTOR will notify the ENGINEER 48 hours prior to the collection of soil and/or groundwater samples for laboratory analyses. The ENGINEER or his representative shall be present during all sampling.

3.02 SITE HEALTH & SAFETY

- A. The CONTRACTOR is solely responsible for controlling Site health and safety, including the provision of a Site Health and Safety Officer. In the performance of its Work, the CONTRACTOR shall provide for the safety of CONTRACTOR personnel, other CONTRACTOR's personnel, regulatory agency personnel, and the public for the duration of the Contract.
- B. The CONTRACTOR is solely responsible for his/her construction means and methods.
- C. The ENGINEER will be responsible for the health and safety of its personnel only.
- D. The CONTRACTOR shall provide a Health and Safety Plan (HASP) which addresses identified contaminants of concern for the Work under this Contract. Such plan shall conform to the requirements of OSHA 1910.120 and other applicable federal, state,

and local laws, regulations, ordinances, and procedures. The HASP shall be developed and implemented by the CONTRACTOR's Safety Officer experienced with the health and safety requirements of OSHA 1910.120. The HASP shall be revised, as needed, whenever new information about site hazards is obtained.

- E. Personnel performing Work in contaminated or hazardous areas shall be fully trained in accordance with the OSHA 1910.120 and the HASP and shall be thoroughly briefed on anticipated hazards, safety equipment to be employed, safety practices to be followed, and emergency procedures and communications. The CONTRACTOR shall have a medical monitoring surveillance program in place for personnel in accordance with applicable laws and regulations.

3.03 MISCELLANEOUS PROVISIONS

- A. CONTRACTOR must have a valid EPA identification number and any other permits or licenses required by federal, state, and local laws, regulations, ordinances, and procedures for the transportation of hazardous wastes.
- B. The CONTRACTOR shall be responsible for securing necessary and applicable permits, certificates, licenses, and approvals required for the performance of this Work and shall be responsible for the payment of associated fees.
- C. The CONTRACTOR shall comply with required reporting and record keeping requirements in accordance with the provisions of this Contract and applicable federal, state, and local laws, regulations, ordinances, and procedures.
- D. The CONTRACTOR shall be responsible for notifications required by federal, state, and local laws, regulations, ordinances, and procedures. Notifications shall be coordinated with the ENGINEER.
- E. Material Shipping Records and/or Bills of Lading, as appropriate, will be provided and coordinated by the ENGINEER. The Owner will be responsible for signing all waste manifests and bills of lading. In order for CONTRACTOR's operations to proceed without interruption, complete and accurate information shall be provided by the CONTRACTOR during the Submittals process. CONTRACTOR shall be responsible for preparing applications to disposal facilities.

3.04 DUST MONITORING & CONTROL MEASURES

- A. The CONTRACTOR is responsible for monitoring the Work for evidence of airborne particulates (dusts) emanating from the Work area. It shall be the CONTRACTOR's responsibility to continuously monitor the work area for dust levels.
- B. The CONTRACTOR shall take appropriate measures to substantially eliminate the generation of dusts within the Work Area, including use of water provided by the CONTRACTOR and covering all stockpiled wastes and/or soil, except in the immediate vicinity of the excavation, where water may be required to control dust emissions.

- C. The ENGINEER will also be monitoring the site for elevated levels of dusts. In the event that visible emissions are observed, the ENGINEER may direct the contractor to take appropriate measures to mitigate the condition. Failure of the CONTRACTOR to implement measures that reduce dust levels may be cause for suspension of the Work, until otherwise directed by the ENGINEER.

3.05 EXCAVATION OF SOIL

- A. Surplus soil generated from excavation activities associated with the Pumping Station Improvements project shall fall in one of the three soil categories identified. Activities involving Excess soil performed by the CONTRACTOR or SUBCONTRACTORS within the Project Limits shall be performed in a manner which considers the health and safety of CONTRACTOR and SUBCONTRACTOR personnel, support personnel, the ENGINEER and his representatives, and the surrounding environment.
- B. The CONTRACTOR shall minimize the spread and loss of Soil during excavation activities as follows:
 - 1. The CONTRACTOR shall segregate boulders, asphalt, construction debris and other deleterious materials from excavated Soil to the extent practicable and as directed by the ENGINEER. This segregation shall occur at the point of excavation, prior to the transport of soil.

3.06 TEMPORARY SOIL STOCKPILING

- A. The ENGINEER anticipates the need for temporary stockpiling of Excess Soil. Excess Soil shall be transported to and stockpiled at 100 Arlington Street. The following provisions shall apply to the stockpiling at 100 Arlington Street:
 - 1. As directed by the ENGINEER, the CONTRACTOR shall stockpile the Excess Soil into separate approximately 250 cubic yard stockpile areas (physically separated with “Jersey Barriers” by excavation site and labeled) to facilitate separate characterization by CONTRACTOR, and subsequent off-site management.
 - 2. Excess Soil shall be stockpiled at 100 Arlington Street on 6-mil polyethylene sheeting. Excess Soil shall be covered with 6-mil polyethylene sheeting at the end of every working day. Sheeting shall be properly secured such that it remains fully intact during inclement weather conditions.
 - 3. Excess Soil shall be transported from pump station site as soon as possible. In no case shall excavated soil remain stockpiled for more than 120 days from its excavation. In no event shall the total volume of stockpiled soil exceed 500 cubic yards, without the specific approval of ENGINEER.

3.07 OFF-SITE MANAGEMENT OF EXCESS SOIL

- A. The CONTRACTOR shall be responsible for the off-site transportation and disposal of Excess Soil at an approved Disposal Facility.

- B. The CONTRACTOR shall be responsible for coordination of transporter and receiving facility activities. Transporter vehicles used for the transportation of Excess Soil shall be covered, substance compatible, licensed, insured, and permitted pursuant to federal, state, and local laws, regulations, ordinances, and procedures.
- C. Vehicles departing the site shall be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume and content of material carried.
- D. Excess Soil shall not leave the site or stockpile area until the designated receiving facility has agreed in writing to accept the type and quantity of waste/soil to be shipped.
- E. The CONTRACTOR shall complete required facility applications and other pertinent forms for proper transportation and disposal. The ENGINEER shall review and the City will sign the applications. Signatures from the receiving location of materials transported off-site are required. The CONTRACTOR shall be held accountable for ensuring that requirements of the transporter and receiving disposal facility(ies) and federal, state, and local laws, regulations, ordinances, and procedures are complied with and properly documented.
- F. Documentation shall be maintained indicating that applicable laws have been satisfied and that Excess Soil has been successfully transported and received at the disposal facility(ies).
- G. Actual quantities and measurements in the field shall be tabulated by the CONTRACTOR on a daily basis. The CONTRACTOR will not be reimbursed for unit rate work performed without the prior approval.

3.08 SITE CLEANUP

- A. During the course of the Work, the CONTRACTOR shall keep the Site and his operations clean and neat at all times. The CONTRACTOR shall dispose of residue resulting from the site operations; and at the conclusion for the day's Work, he shall remove and haul away surplus materials, lumber, equipment, temporary structures, and any other refuse remaining from the site operations and shall leave the site in a neat and orderly condition.

3.09 DOCUMENTATION

- A. Within 45 days after soil disposal, the CONTRACTOR shall submit to the ENGINEER one (1) original copy of all manifests, certified weigh slips (tons), bills-of-lading, and records of final waste disposition from the accepting disposal facility(ies), and other pertinent documentation.

END OF SECTION

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SECTION 02100
SITE PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for removal of vegetation and topsoil at the site.

1.02 DEFINITIONS

- A. Clearing: Removal of trash, vegetation, or organic matter alive or dead.
- B. Grubbing: Removal of vegetation including stumps, buried logs and roots.
- C. Scalping: Removal of grass turf to a depth of 3 inches.
- D. Stripping: Removal of top soil after scalping operation is complete.

1.03 QUALITY ASSURANCE

- A. Obtain Engineer's approval of staked work limits prior to starting the clearing, grubbing, and stripping.

1.04 PROJECT/SITE CONDITIONS

- A. Environmental Requirements
 - 1. Install erosion and sediment controls prior to starting the Work.
- B. Existing Conditions
 - 1. Temporarily remove property improvements, to the minimum extent necessary, to complete the work and restore improvements to condition which existed prior to construction.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Chips from cleared trees and brush.

PART 3 EXECUTION

3.01 PROTECTION

- A. Do not cut or injure any trees or other vegetation outside the limits of disturbance and/or permanent easement, as indicated on the drawings.
- B. Trees, shrubbery, or planting, along the traveled highways or roads, shall not be removed except with the written approval of the Engineer.
- C. Preserve certain vegetation such as trees, shrubs, hedges and plants within the construction area, as indicated on the drawings to be protected.
- D. Easement Clearing
 - 1. The Engineer shall designate trees to be removed within easement lines.
- E. Work In Improved Property
 - 1. Protect trees, cultivated hedges, lawns, shrubs, and plants that might be damaged by the Contractor's operations.
 - 2. Temporarily replant and care for trees less than 4 inches in diameter that would be damaged by the construction operation. After the construction operations have been substantially completed, replant in their original positions and care for until growth is reestablished. If trees, cultivated hedges, lawns, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced at the Contractor's expense by items of kind and quality existing at the start of the work.
 - 3. Do such handwork as may be required to prevent damage to buildings and improvements.
 - 4. Protect fences and stone walls and if needed to be removed to facilitate construction or if damaged, upon completion of the work, properly restore or repair to at least as good condition as existed prior to start of the work.

3.02 CLEARING

- A. Cut or remove all trees, saplings, brush, and vines, windfalls, logs, and trees lying on the ground, dead trees and stubs more than 1 foot high above the ground surface.
- B. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operations, trees, stumps, and the stubs to be cleared shall be cut as close to the ground surface as practicable, but no more than 6-inches above the ground surface in the case of small trees, and 12-inches in the case of larger trees. Saplings, brush, and vines shall be cut off close to the ground.
- C. Selective Trimming
 - 1. Cut back limbs and branches of trees to be preserved only to the extent necessary for construction.
 - 2. Trim neatly, and cleanly so that the remaining tree will not be damaged and healing will be facilitated. Where limbs and branches over 1 inch in diameter have been cut, the

newly cut area of the tree shall be given a thorough application of approved tree-healing paint.

D. Salvaged Wood

1. Logs, timber and other wood removed in the course of clearing found to be acceptable, as determined solely by the Engineer, shall remain the property of the applicable private property owner or the Owner, unless otherwise directed by the Engineer.
2. Cut logs, timber and other wood in 4 foot lengths and stack, as directed by the Engineer.
3. Prior to the final completion of the contract, all unclaimed logs, timber and other wood previously cut and stacked shall be removed from the site and properly disposed of by the Contractor at no additional cost to the Owner.

E. Chips from Cleared Wood and Brush

1. Stockpile for future use on cleared easements as indicated on the Drawings.
2. Spread at locations shown on the drawings once work is substantially complete.
3. If the wood chips from the cleared wood are not of sufficient amount, the Contractor at his own expense shall furnish the required amount to provide a minimum thickness as shown on the Contract Drawings.
4. Elm wood and elm bark shall not be used as chips for ground cover.

3.03 GRUBBING

- A. Remove completely all stumps.
- B. Remove to a depth of 12-inches all roots larger than 3-inches in diameter.
- C. Remove to a depth of 6-inches all roots larger than 1/2-inches in diameter.
- D. Measure depths from the existing ground surface or the proposed finished grade, whichever is the lower.

3.04 STRIPPING

- A. Strip topsoil, loam and unsuitable earth from the ground surface in areas cleared and grubbed.
- B. Utilize topsoil and loam, where possible, for finished surfacing.
- C. All loam to remain on site.
- D. Dispose of unsuitable materials off site at authorized disposal location.

3.05 DISPOSAL OF CLEARED AND GRUBBED MATERIALS

- A. Dispose of cleared and grubbed materials off site at authorized disposal location.
- B. Such disposal shall be carried on as promptly as possible after removal of material in the clearing and grubbing operations and shall not be left until the final period of cleaning up.

- C. Elm bark whether stripped from the wood or intact with the wood shall be either buried at least 1 ft. below grade in approved dumping areas or burned in a suitable incinerator off-site with satisfactory anti pollution and fire prevention controls to prevent the spread of Dutch Elm Disease.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for designing, furnishing, installing, maintaining, operating and removal of temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction.
2. Requirements for disposing of pumped water.

B. Related Sections

1. Section 02160 – Excavation Support.
2. Section 02200 – Earth Excavation, Backfill, Fill, and Grading.

1.02 DEFINITIONS

- A. Dewatering: Lowering the zone of saturation and intercepting groundwater seepage which would otherwise emerge from the slopes or bottom of the excavations. The purposes of dewatering are to increase the stability of excavated slopes; prevent loss of material from beneath the slopes or bottom of the excavation; improve the excavating and hauling characteristics of on site soil; prevent rupture or heaving of the bottom of an excavation; and dispose of pumped water. In addition, dewatering is required to place and compact structural fill.

1.03 DESIGN REQUIREMENTS

- A. The Contractor is responsible for the adequacy of the dewatering system.

B. Design dewatering systems to:

1. Effectively reduce the hydrostatic pressure and lower the groundwater levels to a minimum of 2 feet below bottom of excavation in sandy soil; and lower the groundwater levels to a minimum of four (4) feet below bottom of excavation in silty soil;
2. Develop a substantially dry and stable subgrade for the protection of subsequent operations.
3. Result in no damage to adjacent buildings, structures, utilities and other work, included in this contract.
4. Depressurize stratified layers of sand that may be confined by silt layers so that a stable excavation bottom is maintained.

- C. Dewatering for construction shall be completed in accordance with the Contractor's chosen method capable of meeting the requirements of this specification.

- D. Methods may include sump pumping, single or multiple stage well point or jet eductor well point systems, deep wells, or combinations thereof.
- E. Locate dewatering facilities where they will not interfere with existing utilities, facilities and/or construction work to be done under this Contract.
- F. Contractor is responsible to obtain all necessary permits from state and local authorities, including Veolia, regarding the operation and discharge of the dewatering system, and to conduct all necessary sampling and testing that may be required by those authorities. The Contractor is responsible for **all associated costs**.
- G. Coordinate the dewatering system design with excavation support system requirements.
- H. Design, provide, install, operate, maintain and remove a temporary surface water control program, which will divert surface water away from excavations, trenches, utilities, and all other work areas.
- I. Design shall include provisions to prevent freezing including but not limited to heat trace, insulation, low temperature alarms, and appurtenances required to insure continuous operation of the dewatering system.
- J. Design the dewatering system to discharge into the treatment system. Provide adequate settling, and filtering facilities so that the discharge to the treatment system does not contain suspended soil particles. Design the discharge so that the treatment facility is not damaged or eroded. The Contractor shall design their sediment removal system to limit the maximum particle size to five (5) microns within the discharge.

1.04 SUBMITTALS

A. Shop Drawings

- 1. In accordance with Section 01300 submit the following prior to dewatering system installation:
 - a. Proposed system components.
 - b. Operational plan to include locations and depth of components.
 - c. Method of disposal of pumped water, including method of insuring proper sediment removal should upset in dewatering system occur.
 - d. Standby power equipment

B. Quality Assurance/Control Submittals

- 1. In accordance with Section 01300 submit the following:
 - a. Dewatering systems to be designed under the direct supervision of a professional Civil Engineer registered in the state which the work is to be done.
 - b. Complete Certificate of Design at the end of this section.
 - c. Provide documentation demonstrating ability and experience of installing contractor for the type of conditions under this contract.
 - d. Names, addresses and telephone numbers of supervisory personnel actively involved in at least five successful projects requiring dewatering.

1.05 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Dispose of all pumped water in accordance with all U.S. Environmental Protection Agency, Massachusetts Department of Environmental Protection (MassDEP), and City of Taunton requirements.

B. Existing Conditions

1. Groundwater surface is subject to seasonal fluctuations and fluctuations during periods of heavy precipitation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PERMITTING

- A. Contractor will be responsible for any other local, state, or federal permitting for the dewatering system.

3.02 SITE PREPARATION

A. Surface Drainage

1. Construct dikes, ditches, pipelines, sumps or other means to intercept and divert precipitation and surface water away from excavations.

B. Drainage of Excavated Areas

1. Construct dikes, ditches, pipelines, sumps or other means to collect surface and seepage water which may enter the excavation. Discharge collected water to the treatment system prior to discharge to the Taunton Municipal Wastewater Collection system.

3.03 INSTALLATION

- A. Advise Engineer of changes made to Operation Plan as submitted under article 1.04 of this section, made to accommodate field conditions.
- B. Install additional dewatering facilities as needed to adequately dewater as specified herein at no additional cost to the Owner.
- C. Complete effluent sampling in accordance with the Industrial Pretreatment Permit.
- D. Sumps shall be provided with suitable filter materials to prevent the migration or pumping of existing soil fines and subsequent subgrade weakening and disturbance.

3.04 MONITORING

- A. Observe and record daily flow records during the length of the dewatering operation and provide data to Engineer on daily basis.

3.05 OPERATION

- A. Operate dewatering systems to lower the groundwater level in excavations allowing the Work to be performed on a stable dry subgrade.
- B. Modify dewatering procedures which cause, or threaten to cause, damage to new or existing facilities, in the opinion of the Engineer, to prevent further damage. Modifications shall be made at no additional expense to the Owner.
- C. Effectively reduce the hydrostatic pressure and lower the groundwater levels to a minimum of two (2) feet below the bottom of excavation in sandy soil; and lower the groundwater levels to a minimum of four (4) feet below the bottom of excavation in silty soil.
- D. Prevent disturbance of foundation soils and loss of ground as water is removed.
- E. Notify the Engineer of disturbance to the foundation soils caused by an interruption or inadequacy of the dewatering system.
- F. Maintain on-site auxiliary equipment to operate the dewatering system continuously, while the excavation is open and as directed by the Engineer.
- G. If sediment or other materials discharged from the dewatering system accumulates in the drains, conduits or other utilities, the Contractor shall be responsible to completely clean and remove all sediment from impacted utilities to the satisfaction of the Owner and at no additional cost to the Owner.

3.06 DISPOSAL OF WATER

- A. Discharge water in a manner that will not cause erosion, flooding, damage to existing facilities, completed Work or adjacent property, improved or otherwise.
- B. Method of disposal of pumped water, including method of insuring proper sediment removal if a breakdown in the dewatering treatment system should occur, including sedimentation/fractionation tank treatment prior to the discharge of pumped groundwater.
- C. Method of groundwater sediment control treatment and components of the system.
- D. Contractor shall complete and submit permit application for disposal of pumped groundwater to the wastewater collection system. Contractor responsible for all associated permit fees.

3.07 REMOVAL

- A. Remove all wells, sumps, material and equipment from the site upon completion of dewatering operations.
- B. Seal all existing and proposed dewatering wells upon completion of the dewatering by pressure injecting a grout capable of sealing the wells and preventing leakage.

END OF SECTION

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CERTIFICATE OF DESIGN

Re: Contract Between

OWNER: _____
(Name)

and
CONTRACTOR: _____
(Name)

on
CONTRACT: _____
(Title)

_____ Dated: _____
(Number)

Contractor hereby certifies that _____
(Designer)

1. Is licensed or registered to perform professional engineering work in the state of _____
(Location of Project)

2. Is qualified to design the _____
(Item)
specified in Section _____ of the subject contract;

3. Has designed _____ before;

4. Has prepared the design in full compliance with the applications and requirements of
Section _____ of subject contract including all applicable laws, regulations, rules and
codes; and

5. The work has been signed and sealed pursuant to the applicable state law.

FOR: _____
(Contractor)

BY: _____
(Signature)

_____ Dated: _____
(Name and Title)

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SECTION 02149

MAINTAINING EXISTING FLOW

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to maintain existing flow and implement and complete all flow diversions and/or bypass pumping required to complete the Work indicated on the Drawings.

1.02 PERFORMANCE REQUIREMENTS

- A. It is essential to the operation of the existing sewerage system that there be no interruption of the wastewater flow throughout the duration of this project. An interruption shall be considered, but may not be limited to, any condition that in the sole opinion of the Engineer adversely affects or alters operation of the existing sewage system and/or any other portion or component of the existing collection system including the associated flows; allows the level of sewage flow to increase, rise, collect, surcharge and/or overflow existing facilities in any manner; or results in any operational or permit violations being issued to the Owner.
- B. The Contractor shall provide, maintain, and operate temporary facilities such as dams, bulkheads, pumping equipment (both primary and backup units as required) conduits, electrical power, and all other labor and equipment to intercept and maintain the existing sewage flow before it reaches the point where it would interfere with his work, carry it past his work, and return it to the existing facilities beyond his work.
- C. The Contractor's attention is directed to the fact that in some locations the existing wastewater flow is a result of a combined system. Increases in normal flow should be expected during periods of wet weather. The Contractor shall therefore take all precautions necessary including monitoring weather forecasts to fully accommodate, control and sufficiently handle the increases in flow during periods of wet weather and/or storms as well as periods of normal flow.
- D. The Engineer may prohibit the carrying out of any work at any time when in his sole judgment, increased flow conditions are unfavorable or not suitable, or at any time, regardless of the existing flows, when proper precautions are not being taken to safeguard the existing sewerage system, previously constructed work, work in progress and/or the general public.
- E. In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Owner may require, at no additional expense to the Owner.
- F. Pump Station Design Capacity:

Pump Station	Flow Rate (gpm)	Force Main Diameter (inch)	Force Main Length (feet)
Davis Street	200	4	2850
Industrial Park	2,200	12	5500
Myles Standish	350	8	1600
Partridge Circle	50	2	360
School Street	150	4	430
Stevens Street	350	6	700
Wellesley Circle	125	4	320

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

1. Detailed plans and descriptions outlining all provisions and precautions to be taken regarding the control and handling of existing sewage flows.
2. Include such items as schedules, locations, elevations, capacities of equipment, materials, traffic maintenance plans, and all other incidental items necessary and/or required by the Owner to ensure proper protection of the facilities and compliance with the requirements herein specified.
3. Qualifications as described herein.
4. Detailed proposal for noise prevention measures for review.
5. Shop drawings for all pumping, piping, and appurtenances for type and size of equipment required to perform the flow diversion and/or bypass pumping work as required herein.
6. Any deviations from the suggested bypass pump and piping locations provided on the Drawings shall be submitted for approval prior to installation.

1.04 QUALITY ASSURANCE

A. Qualifications

1. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor who can demonstrate to the Engineer that he specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of similar size and complexity in wastewater applications performed by his firm within the past three years within New England. The bypass system shall meet the requirements of codes and regulatory agencies having jurisdiction.
2. The vendor shall demonstrate the bypass pumping equipment is automated and is capable of functioning without the assistance of an operator.

3. The vendor shall demonstrate the pumping equipment can operate for an extended period of time running dry. After this period of time, the pump shall have the capability of pulling a 25” Hg vacuum without adjustment or repair.
4. The vendor shall demonstrate sufficient service resources and repair parts in stock to fulfill service or repair of rental equipment within one hour of a service call, twenty-four hours per day, seven days per week.
5. Temporary components of the bypass system including pumps, pipe, hose, valves, and fittings shall be provided by one bypass vendor. Hydraulic calculations and drawings required by the submittals shall be provided by the bypass vendor and stamped and certified by a Professional Engineer licensed in the Commonwealth of Massachusetts.

B. Pre-Installation Meeting

1. Contractor to schedule and attend a pre-installation meeting with the vendor, Owner and Engineer prior to installation of by-pass system.

PART 2 PRODUCTS

2.01 GENERAL

- A. At a minimum, all equipment shall be supplied in duplicate for emergency situations. Provide adequate on-line backup facilities so that no interruption in service is encountered. Equipment and installation are subject to the approval of the Owner and the Engineer.

2.02 PUMPER TRUCKS

- A. Where pumper trucks are planned to maintain flow, Contractor shall have a minimum of one primary pumper truck and one pumper truck on standby to assure continued service in the event of equipment failure or higher than normal flow conditions.
- B. Pumper trucks shall only be considered with the following conditions:
 1. Where service areas are less than 20 homes
 2. Pump trucks shall only be only used during normal work hours.
 3. Use of pump trucks during non-working hours must be approved by the Engineer.

2.03 PUMPING SYSTEM(S)

- A. All pumping units (primary and secondary) and appurtenances shall be sized properly to handle the flows encountered including increased flows due to wet weather.
- B. Pumps shall be centrifugal, end suction, fully automatic self-priming pumps that do not require the use of foot-valves, vacuum pumps, diaphragm pumps, or isolation valves in the priming system. The pumps may be electric or diesel powered. Pumps must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows and shall immediately develop 25” Hg vacuum

without adjustment or repair or employ level control devices to regulate on/off or variable speed of the pump. Pumps shall be CD low noise units as manufactured by Godwin Pump of America, Inc, or approved equal. All pumping units and appurtenances shall be sized in accordance with the design parameters provided. Pumps shall not be connected by a common suction manifold.

- C. Seals shall be high pressure, mechanical self-adjusting type with silicon carbide faces capable of withstanding suction pressures to 100 psi running. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for extended periods of time. All metal parts shall be of stainless steel. Elastomers shall be Viton.
- D. The Contractor shall provide the necessary start/stop controls for each pump.
- E. The Contractor shall be responsible to meet noise requirements in specified elsewhere in this section. All diesel driven primary and standby pumps shall be sound attenuated. The use of Critical Silenced Canopy pumps or acoustical Whisper Pac enclosures for sound attenuation are required.
- F. The pumps may be electric or diesel powered. **Note, the Contractor is required to obtain and pay for a temporary electric service if electric is utilized.**

2.04 PIPING SYSTEM(S)

- A. All piping systems (primary and secondary) and appurtenance shall be sized properly to handle the flows encountered including increased flows due to wet weather.
- B. Provide temporary bypass suction piping from the upstream manhole(s) to the bypass pumps, and temporary discharge piping from the bypass pumps to the downstream discharge manhole(s).

2.05 POWER GENERATING FACILITIES

- A. Include power generating facilities capable of providing all power necessary to operate any primary and secondary pumping systems. The Contractor is responsible for all costs associated with powering the bypass system.
- B. Maintain facility to be ready for use if required.

2.06 NOISE PREVENTION

- A. Noise prevention measures for all equipment shall be used to insure minimum noise impact or surrounding areas.
- B. Measures may include but shall not be limited to enclosures, insulation, electric pumping units, and hospital grade silencers or mufflers.
- C. Noise levels shall be maintained such that increase shall not exceed 10 dBA over background at the nearest property line.

- D. Should at any time prior to or during the performance of above mentioned work, the Engineer determines the noise prevention measures being used are not adequate, the Contractor shall at no additional cost to the Owner suspend all work until acceptable measures are incorporated.

2.07 ALARM SYSTEM AND RESPONSE

- A. Pumping system shall be equipped with an alarm system capable of remote notification. Notification shall be automatic to a preprogrammed list approved by the Owner/Engineer.
- B. At a minimum the following call-out alarms shall be provided.
 - a. High Level
 - b. High-High Level
- C. The Contractor shall respond to any alarm within 1-hour of receiving an alarm notification.

PART 3 EXECUTION

3.01 PUBLIC SAFETY AND CONVENIENCE

A. General

- 1. The Contractor shall at all times keep the streets, highways, roads, driveways, parking lots, private walks, and public sidewalks open for pedestrian and vehicular traffic unless otherwise authorized by the Owner/Engineer. Sidewalks, crosswalks, and access points shall be established and maintained in accordance with the requirements of the Americans With Disabilities Act (ADA).

B. Public Travel Ways

- 1. Any authorized temporary closure of any streets, highways or roads shall be coordinated with the local Fire, Police and/or Department of Public Works as required by the municipality.

C. Municipal, Commercial and Private Property

- 1. Any authorized, temporary closure of any municipal, commercial or private driveway or access route will require the Contractor provide 48 hour notice to abutters of the temporary restriction of access to their property. The Contractor will make every attempt to schedule his work with as little inconvenience to the property owner as possible

3.02 INSTALLATION

- A. Keep the Engineer advised at all times of any changes made to the overall operation(s) to accommodate field conditions.

- B. Flow diversions and/or bypass pumping shall be maintained at all times as long as it is necessary to maintain the flow through the limits of the project during construction.
- C. Maintain auxiliary and/or emergency equipment at the site to continue flow division and/or by-pass pumping operations in the event of a breakdown and/or loss of normal power.
- D. The Contractor shall be responsible for the proper functioning and operation of the backup pumping units. Back-up pump(s) shall be on-line, isolated from the primary system by a valve.
- E. No work shall begin until all provisions and requirements of this Section have been reviewed and approved by the Engineer.
- F. The Engineer reserves the right to limit and/or otherwise restrict the Contractor's overall activities and/or operations at any time without claim should the Engineer deem it to be in the Owner's or public's best interest to do so.
- G. . The Contractor shall successfully test bypass pumps in continuous automatic operation for a duration of 2 days, before taking the existing pumping station offline for demolition.
- H. Bypass system shall remain onsite fully functional until new station operates continuously for 7 days uninterrupted in automatic mode and after Owner's and Engineer's acceptance of all field and functional testing.

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SECTION 02160

EXCAVATION SUPPORT

PART 1 GENERAL

1.01 DESCRIPTION

- A. The Contractor shall properly design and furnish all labor and materials necessary and shall construct complete, all sheeting, bracing supports, and appurtenances required to perform the Work including sheet piling for construction of structures and buildings, trench support and cofferdams, permanent and temporary alike, as indicated on the Drawings and specified or as otherwise directed by the Engineer or required by agencies having jurisdiction over the Work.
- B. Wood timber or steel sheeting shall be used except where otherwise indicated, specified or directed by the Engineer and agencies having jurisdiction over the work.

1.02 DESIGN RESPONSIBILITY

- A. The Contractor shall be fully responsible for providing complete and adequately designed sheeting as required and/or directed by the Engineer in accordance with the provisions set forth herein. The sheeting shall be designed to resist hydrostatic pressures in accordance with the Contractor's dewatering design.
- B. The Contractor shall engage, at his own expense, the services of a fully competent and qualified Professional Engineer, hereinafter referred to as the "Contractor's Engineer", registered in the State in which the Work is being constructed, for the design of all sheeting requirements to accomplish the Work specified, and for supervising the proper on-site installation associated therewith. The Contractor's Engineer shall be acceptable to the Engineer and demonstrate a minimum of ten (10) years documented experience in the field of sheeting design and implementation. Prior to the actual employment of the Contractor's Engineer, the Contractor shall submit to the Engineer, to the full extent deemed necessary, a detailed resume stating the Contractor's Engineer's professional qualifications, related experience and references, and if requested, examples of work similar to that required for the Work specified, for a general review by the Engineer and a means of documenting the requisite experience hereinbefore specified. Only after a satisfactory review of the Contractor's Engineer's overall qualifications by the Engineer in fulfillment of the requisite experience hereinbefore specified shall the Contractor finalize such employment and begin the design aspects of the Work.
- C. The Contractor's attention is directed to the fact the acceptance of the Contractor's Engineer and/or his/her qualifications by the Owner and/or Engineer shall not be an overall approval of the Contractor's Engineer nor the sheeting designs and methods of installation employed during the Work. It being understood that all sheeting requirements necessary to accomplish the Work specified and/or indicated on the Drawings shall be designed by and installed under the direct supervision of the Contractor's Engineer who shall ultimately and fully bear the responsibility for that Work.

1.03 QUALITY ASSURANCE

- A. The Contractor's Engineer shall provide and maintain throughout the sheeting installation and/or Work sufficient supervision and technical guidance to the Contractor for proper sheeting materials, equipment, operations and methods to the extent necessary to assure strict compliance with the Contractor's Engineer's design, all safety procedures and standard requirements for such Work, and the successful completion of the Work. Failure to provide and/or maintain such supervision and/or technical guidance during the Work shall in no way relieve the Contractor's Engineer and/or the Contractor from their overall responsibilities and obligations under the Contract, nor shall it be a basis for any claim by either against the Owner and/or Engineer.
- B. The Contractor and Contractor's Engineer shall fully indemnify and save harmless the Owner and Engineer and their agents, employees and representatives, from and against any and all claims as stipulated under the Agreement, whether directly or indirectly arising out of, relating to or in connection with the Work.
- C. Quality assurances and proper safety procedures must be maintained at all times and be in strict accordance with the Contractor's Engineer's requirements and consistent with all federal, state and local regulatory agencies having jurisdiction over the Work. Should any conflict in requirements, regulations, restrictions or codes exist between that which is specified by the Contractor's Engineer and any federal, state or local agency, the more stringent application shall prevail.

1.04 PRODUCTS AND DESIGN CRITERIA

- A. The overall sheeting design, quality of materials and methods of installation for all sheeting applications necessary to accomplish the Work specified shall be consistent with the established standards of the construction industry and must, as a minimum, comply with the requirements for earth support systems for excavations as defined by current US Department of Labor, Occupational Safety and Health Act (OSHA) regulation applicable thereto, and any other federal, state and local agencies having jurisdiction and/or requirements pertaining thereto including Building Code requirements for the State in which the work is being performed. The design and implementation thereof shall be in accordance with sound engineering practice and modern accepted principles of soil mechanics, and shall include the effects of hydrostatic forces and all surcharge loads which may be reasonable anticipated. The methods employed shall be to the extent necessary to permit the proper and satisfactory installation and construction of the Work specified; to withstand all loads and forces encountered; to provide soil restraint and control of water as required; to insure the safety of the workers and all other personnel on or near the site; to prevent injurious caving or erosion, or loss of ground; to maintain at all times proper and safe pedestrian, vehicular traffic on public and private streets, property and rights-of-way; and to stabilize unforeseen areas of work encountered during the execution of the Work as deemed necessary by the Owner and/or Engineer.
- B. The Contractor and Contractor's Engineer's attention is directed to the fact that should any additional investigations, subsurface explorations and/or other appurtenant information be required to fulfill the needs of this design, as determined by the Contractor's Engineer above and beyond that which is already provided under these Contract Documents, the Contractor shall obtain all such information and data required at his own expense.

1.05 SHOP DRAWINGS AND/OR DESCRIPTIVE LITERATURE

- A. Prior to the installation of any sheeting, the Contractor shall submit to the Engineer for documentation ONLY, complete sheeting layout and detail drawings and sheeting descriptions bearing the Contractor's Engineer's State of **Massachusetts** Professional Seal and signature. Said submission shall be for informational purposes only as a means of documenting the work to be performed and will not be considered an approval or disapproval of the design and/or the implementation thereof. This submission will not relieve the Contractor of the sole responsibility for the adequacy of the system nor shall it be construed as an approval or guarantee that the Contractor's proposed equipment, materials and methods for the sheeting, bracing or appurtenances will be adequate for the work required at the locations of and for the Work required by this Contract.
- B. Included as part of this submission, the Contractor's Engineer must provide a complete listing of all references, codes and specifications used by the Contractor's Engineer and required by any federal, state or local agency having jurisdiction, and to which the sheeting design conforms.
- C. Specific design calculations are not to be submitted to the Engineer. In the event design calculations are submitted to the Engineer, they shall be returned to the Contractor without review nor checking by the Engineer.

1.06 CERTIFICATE OF DESIGN

- A. The Contractor's special attention is directed to the required "Certificate of Design", the form of which is provided at the end of this Section. The Contractor and Contractor's Engineer shall complete this "Certificate" in its entirety for each location of work to be done, and any revisions associated there with, and submit it simultaneously with, as an integral part thereof, the sheeting submission. Any submission made without the completed "Certificate", appropriately signed and sealed, shall be returned to the Contractor. The Owner and/or Engineer hereby reserves the right to delay sheeting work and/or any work associated with, or dependent upon, the proper implementation of sheeting, without cause for claim against the Owner or Engineer, until a complete and appropriate submission is rendered. This Certification shall indicate that the sheeting, bracing and all appurtenances related thereto are designed to withstand the required loads, forces to be encountered, and to provide soil and water control, and are in compliance with these specifications and all federal, state or local agencies having jurisdiction over the Work to be performed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Timber sheeting and bracing:
 - 1. Timber sheeting and bracing may be of any species of wood which will satisfactorily withstand all driving and construction stresses and the loads to which the members will be subjected. Sheeting shall not be less than 3 inches nominal thickness and shall be provided with continuous interlocks. All timber sheeting and bracing shall be free from worm-holes, windshakes, loose knots, decayed or unsound portions or other defects which might impair its strength or tightness.

B. Steel sheeting:

1. The shapes, sizes, and lengths of steel sheeting to be utilized are optional with the Contractor, providing they are satisfactory to withstand all driving and construction stresses and provided with continuous interlocks.

C. Bracing, Hardware and Fastenings:

1. Bracing and other supports whether of steel or of timber, shall be of the strength and dimensions necessary to satisfactorily withstand the loads to which they will be subjected. All bracing and other supports shall be free from any defects which might impair this strength. The Contractor shall provide all necessary hardware and fastenings necessary in connections with satisfactory installation of all sheeting and bracing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall be fully responsible for ensuring adequate safety measures are provided at all times and shall comply with all safety requirements of federal, state and local agencies having jurisdiction over the Work. Installation of the sheeting including all bracing, supports and appurtenances, shall be adequate to permit the performance of the Work and be in accordance with the requirements of the Contractor's Engineer and the sheeting design associated therewith.
- B. Any movements of sheeting and/or appurtenances which prevent the proper completion of the work shall be corrected at the expense of the Contractor.
- C. Sheeting shall be installed in a manner which will prevent the disturbance of the surrounding surface, subsurface conditions and/or structures. Any such disturbances shall be corrected at the Contractor's expense and to the satisfaction of the Engineer.

3.02 REMOVAL

- A. If used no sheeting shall be removed except with specific written approval by the Engineer.
- B. Sheeting shall be cut-off as directed by the Engineer.
- C. All sheeting approved for removal by the Engineer shall become the property of the Contractor.
- D. All restoration and clean up shall be as indicated and as specified.

CERTIFICATE OF DESIGN

(Owner)

Contract Reference: _____
_____, dated _____.

In accordance with the provisions of the above referenced Contract, as the designated Contractor,

(Contractor's Name and Address)

hereby certifies that _____

(Contractor's Engineer's Name and Address)

(1) Is properly licensed and currently registered as a Professional Engineer in the State (or Commonwealth) of _____;

(2) Is fully qualified to design and supervise the _____

(Item of work and location)

In accordance with the provision specified under the appropriate Section and/or Subsections of the Contract Documents:

(3) Has successfully designed and supervised _____

(Item of work)

before and demonstrates a minimum of ten (10) documented years of proven experience in such field;

(4) Has personally examined the type(s) and locations(s) of the Work required under this Contract, and the overall conditions associated therewith, to the extent necessary to fully satisfy his or her professional responsibilities for designing and supervising the above referenced work;

- (5) Has prepared the attached design in full compliance with the applications and requirements of the Contract Documents, sound engineering practice, modern accepted principles of construction, and all applicable federal, state and local laws, regulations, rules and codes having jurisdiction over the Work;
- (6) Will provide sufficient supervision and technical guidance to the Contractor throughout the Work to ensure compliance with the design and all quality assurances necessary to successfully complete the Work;
- (7) Hereby indemnifies and holds harmless the _____
 _____ and BETA Group, Inc.,
 (name of owner)
 and their agents, employees and representatives, from and against any and all claims, whether directly or indirectly, arising out of, relating to or in connection with the Work; and
- (8) This "Certificate of Design" together with all applicable designs, drawings, details, specifications on other related documents necessary to complete the Work as specified, have been signed and sealed pursuant to applicable state law.

In recognition and observance of the above referenced statements, the undersigned parties hereby acknowledge and accept the responsibilities and obligations associated therewith.

CONTRACTOR:

CONTRACTOR'S ENGINEER:

(Contractor's Name)

(Engineer's Name)

By: _____

By: _____

(Name and Title)

(Name and Title)

Date: _____

Date: _____

(SEAL)

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SECTION 02200

EARTH EXCAVATION, BACKFILL, FILL AND GRADING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for; excavating in earth for trenches and structures; backfilling excavations; furnishing necessary material; compaction; constructing embankments and fills; miscellaneous earth excavations and miscellaneous grading.

B. Related Sections

1. Section 01410 - Testing Laboratory Services
2. Section 02140 – Dewatering
3. Section 02149 – Maintaining Existing Flow
4. Section 02160 – Excavation Support
5. Section 02215 - Aggregate Materials
6. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

1.03 QUALITY ASSURANCE

A. Field Samples

1. Provide samples of materials as requested by the Engineer, to the Quality Control Engineer hired by the Owner, prior to delivery of materials on site, in order to facilitate field testing of compaction operations and material properties.

1.04 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. There are pipes, drains, and other utilities in locations not indicated on drawings, no attempt has been made to show all services, and completeness or accuracy of information given is not guaranteed.

1.05 MAINTENANCE

- ###### A. Maintain all work in accordance with SECTION 01800.

PART 2 PRODUCTS

2.01 MATERIALS

A. Suitable Aggregate

1. The nature of materials will govern both acceptability for backfill and methods best suited for placement and compaction.
2. All material whether from excavations or from borrow pits, after being placed and properly compact, will make a dense stable fill and containing no vegetation, masses of roots, individual roots more than 18 inches long, or more than 1/2 inch in diameter, stones over 6 inches in diameter, or porous matter.
3. Organic matter to be well distributed and not to exceed minor quantities.

B. Trench and Excavation Backfill

1. In general, and unless other material is indicated on drawings or specified, material used for backfilling trenches and excavations shall be suitable material which was removed in the course of making the construction excavations. If sufficient suitable material is not available from the excavations, the backfill material shall be crushed stone, gravel borrow or select borrow as directed by the Engineer, in accordance to respective Specification Sections.
2. See Section 2.01.C for excavation backfill requirements under and adjacent to foundation walls.

C. Structure Backfill

1. Unless otherwise indicated or specified, all fill and backfill under and adjacent to structures, foundations walls, and pavement adjacent to structures shall be gravel borrow that consist of inert material that is hard, durable stone and coarse sand, free of loam and clay, surface coatings, and deleterious materials. Gradation requirements for backfill gravel shall be in accordance with SECTION 02215.
2. Excavated material shall not be permitted for backfill of structures or foundation walls.

D. Filling and Embankment Backfill

1. Suitable selected materials available from the excavations and not required for backfill around pipes or against structures may be used for filling and building embankments, except as otherwise specified. Material needed in addition to that available from construction operations shall be obtained from suitable gravel banks or other suitable deposits. The Contractor shall furnish, at his own expense, all borrow material needed on the work.

E. Additional materials

1. Concrete: In accordance with SECTION 03300.
2. Crushed stone: In accordance with SECTION 02215.
3. Gravel borrow: In accordance with SECTION 02215.
4. Select borrow: In accordance with SECTION 02215.

2.02 EQUIPMENT

A. Well Points

1. Designed to drain soil and prevent saturated soil from flowing into excavation.

B. Pumping Units

1. Designed for use with the wellpoints, capable of maintaining a high vacuum and, handling large volumes of air and water at the same time.

C. Underdrain Pipe

1. HDPE pipe enclosed in crushed stone encased in filter fabric.
2. Sewer pipe of quality known as "seconds".

2.03 SOURCE QUALITY CONTROL

- A. Provide Engineer with access to location of off site sources of materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all existing utilities and facilities prior to excavation.

3.02 PROTECTION

A. Utilities

1. Support and protect from damage existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer decides must be preserved in place without being temporarily or permanently relocated.
2. Restore items damaged during construction without compensation, to a condition at least equal prior to construction.

B. Trees

1. Enclose the trunks of trees adjacent to work with substantial wooden boxes of height necessary to protect trees from injury from piled material, equipment, operations or otherwise.
2. Employ excavating machinery and cranes of suitable type and size and operate with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.
3. When trimming is required, make all cuts smooth and neat without splitting or crushing.
4. Cover cut areas with an application of grafting wax or tree healing paint.
5. Branches, limbs, and roots shall not be cut except by permission of the Engineer.

C. Plantings

1. Protect by suitable means or temporarily replant and maintain cultivated hedges, shrubs, and plants which may be injured by the Contractor's operations
2. Replant in their original positions and care for until growth is re-established, once the construction operations have been substantially completed.

3. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of kind and quality at least equal to which existed prior to the start of the Work.

D. Paved surfaces

1. Do not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels shaped as to cut or injure paved surfaces.
2. All surfaces which have been injured by the Contractor's operations shall be restored to a condition at least equal to which existed prior to start of the Work.
3. Suitable materials and methods shall be used for such restoration.

3.03 PREPARATION

A. Pavement Removal

1. Remove only existing pavement as necessary for the prosecution of the work.
2. Engineer may require that pavement be cut with pneumatic tools or saws without extra compensation to Contractor, where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
3. Dispose large of pieces of broken pavement before proceeding with excavation.

B. Top Soil Removal

1. From areas which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.

C. Subgrade

1. Remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas where embankments will be built or material will be placed for grading.
2. Shape as indicated on the drawings and prepare by forking, furrowing, or plowing to bond first layer of the new material placed.

3.04 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

A. The structures to which the provisions of this article apply include pipes, wires, and other structures which meet all of the following:

1. Are not indicated on the drawings or otherwise provided for.
2. Encroach upon or are encountered near and substantially parallel to the edge of the excavation.
3. In the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

B. In removing existing pipes or other structures, the Contractor should use care to avoid damage to materials, and the Engineer shall include for payment only those new materials which, in his judgment, are necessary to replace those unavoidably damaged.

C. Whenever the Contractor encounters certain existing structures as described above and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed to change the location of, remove and later restore, or replace such structures, or to assist the

Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.

- D. When fences interfere with the Contractor's operations, he shall remove and (unless otherwise specified) later restore them to a condition which existed prior to the start of the Work, all without additional compensation. The restoration of fences shall be done as promptly as possible and not left until the end of the construction period.

3.05 SHEETING AND BRACING

- A. Provide in accordance with Specification Section 02160.

3.06 DEWATERING

- A. Provide in accordance with Specification Section 02140.

3.07 EXCAVATION

- A. Execute operation of dewatering, sheeting and bracing without undermining or disturbing foundations of existing structures or of work previously completed under this contract.
- B. Excavate to widths that provide suitable room for:
 - 1. Building structures or laying and jointing piping.
 - 2. Placing all sheeting, bracing, and supports.
 - 3. Cofferdamming, pumping and draining.
- C. Render bottom of excavations firm, dry and acceptable in all respects.
- D. Do not plow, scrap or dig by machinery, earth at finished subgrade which results in disturbance of material below subgrade, unless indicated or specified, and remove with pick and shovel, last of material to be excavated, just before placing pipe, masonry or other structure.
- E. Make all excavations in open, except as otherwise specified or permitted.
- F. Excavation Near Existing Facilities
 - 1. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools. Such manual excavation when incidental to normal excavation shall be included in the work to be done under items involving normal excavation.
- G. Unauthorized Excavation
 - 1. If the bottom of any excavation is taken out beyond the limits indicated or prescribed, the resulting void shall be backfilled at the Contractor's expense with thoroughly compacted gravel borrow, if the excavation was for a pipeline, or with Class B concrete, if the excavation was for a masonry structure.
- H. Unsuitable Material

1. If material unsuitable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted, crushed stone, gravel borrow, fine aggregate or concrete as directed.

3.08 TRENCHING

A. Trench Excavation

1. Where pipe is to be laid in specified bedding material or concrete cradle, the trench may be excavated by machinery to, or to just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.
2. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery, but, just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.

B. Depth Of Trench

1. Excavate trench to depths permitting the pipe to be laid at the elevations, slopes, or depths of cover indicated on the drawings, and at uniform slopes between indicated elevations.

C. Width Of Trench

1. Excavate trench as narrow as practicable and do not widen by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
2. Excavate trenches with approximately vertical sides between the elevation of the center of the pipe and an elevation 1 ft. above the top of the pipe.

D. Trench Excavation In Fill

1. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least 1 ft. above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.

- E. Length of trench open at any one time will be controlled by conditions, subject to any limits that may be prescribed by Engineer.

3.09 BACKFILLING

A. General

1. Frozen material shall not be placed in the backfill nor shall backfill be placed upon frozen material. Previously frozen material shall be removed or shall be otherwise treated as required, before new backfill is placed.

B. Fill And Backfill Under Structures

1. The fill and backfill materials shall be placed in layers not exceeding 6 in. in thickness. Unless otherwise indicated or specified, each layer shall be compacted to 95 percent in accordance with ASTM D1557.

C. Backfilling Around Structures

1. Do 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 done, special leakage tests, if required, shall be made. Promptly after the completion of such tests, the backfilling shall be started and then shall proceed until its completion. Excavated materials shall not be used in backfilling of structures. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.
2. The material shall be placed and compacted to 90 percent in accordance with ASTM D1557 unless otherwise indicated or specified.

D. Backfilling Pipe Trenches

1. As soon as practicable after the pipes have been laid and the joints have acquired a suitable degree of hardness, if applicable, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, the backfilling shall be started and thereafter it shall proceed until its completion.
2. With the exception mentioned below in this paragraph, trenches shall not be backfilled at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may, at his own risk backfill the entire trench, omitting or including backfill at joints as soon as practicable after the joints have acquired a suitable degree of hardness, if applicable, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
3. No stone or rock fragment larger than 12 in. in greatest dimension shall be placed in the backfill nor shall large masses of backfill material be dropped into the trench in such a manner as to endanger the pipeline. If necessary, a timber grillage shall be used to break the fall of material dropped from a height of more than 5 ft. Pieces of bituminous pavement shall be excluded from the backfill unless their use is expressly permitted, in which case they shall be broken up as directed.
4. Zone Around Pipe
 - a. Backfilled with the materials and to the limits indicated on the drawings.
 - b. Material shall be compacted to 90 percent by tamping.
5. Remainder of Trench
 - a. Compact by water-jetting, or tamping, in accordance with the nature of the material to 95 percent in accordance with ASTM D1557. Water-jetting may be used wherever the material does not contain so much clay or loam as to delay or prevent satisfactory drainage. However, tamping shall be used if water-jetting does not compact the material to the density required.
6. Excavated material which is acceptable to the Engineer for surfacing or pavement subbase shall be placed at the top of the backfill to such depths as may be specified

elsewhere or as directed. The surface shall be brought to the required grade and stones raked out and removed.

E. Placing And Compacting Embankment Material

1. After the subgrade has been prepared as hereinbefore specified, the material shall be placed thereon and built up in successive layers until it has reached the required elevation.
2. Layers shall not exceed 12 in. in thickness before compaction. In embankments at structures, the layers shall have a slight downward slope away from the structure; in other embankments the layers shall have a slight downward slope away from the center. In general, the finer and less pervious materials shall be placed against the structures or in the center, and the coarser and more pervious materials, upon the outer parts of embankments.
3. Each layer of material shall be compacted by the use of approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.
4. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.
5. The portion of embankments constructed below proposed structures shall be compacted to 95 percent in accordance with ASTM D1557. The top 2 ft. of an embankment below a pavement base shall be compacted to 95 percent. All other embankments shall be compacted to 90 percent in accordance with ASTM D1557.

3.10 METHODS OF COMPACTION

A. Water-Jetting

1. Saturate backfill material throughout its full depth and at frequent intervals across and along the trench until all slumping ceases.
2. Furnish one or more jet pipes, each of sufficient length to reach the specified depth and of sufficient diameter (not less than 1-1/4 in.) to supply an adequate flow of water to compact the material.
3. Equip jet pipe with a quick-acting valve, supply water through a fire hose from a hydrant or a pump having adequate pressure and capacity to achieve the required results.

B. Tamping and Rolling

1. Deposit backfill material and spread in uniform, parallel layers not exceeding 8 in. thick before compaction. Before the next layer is placed, each layer shall be tamped to obtain a thoroughly compacted mass. Care shall be taken that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar power equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling, and compacting.

2. If necessary to ensure proper compaction by tamping (or rolling), the backfill material shall first be wet by sprinkling. However, no compaction by tamping (or rolling) shall be done when the material is too wet either from rain or too great an application of water to be compacted properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Miscellaneous Requirements.

1. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. Only suitable quantities of stones and rock fragments shall be used in the backfill; the Contractor shall, as part of the work done under the items involving earth excavation and rock excavation as appropriate, furnish and place all other necessary backfill material.
2. All voids left by the removal of sheeting shall be completely backfilled with suitable materials, and thoroughly compacted.

3.11 DISPOSAL OF SURPLUS EXCAVATED MATERIALS

- A. No excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or permitted by the Engineer.
- B. Surplus excavated materials suitable for backfill shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes within a haul of 1 mile from the point of excavation; all as directed or permitted and without additional compensation.
- C. Surplus excavated materials not needed as specified above shall be hauled away and dumped by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him.

3.12 DISPOSAL OF SPECIAL WASTES

- A. The Contractor's attention is directed to the requirements set forth by the State of Massachusetts, Department of Environmental Protection, (MA DEP) regarding "Special Wastes" and the proper disposal thereof. All waste materials and debris, as designated by the Owner and/or Engineer, including but not limited to any sewers, storm drains, catchbasins, and combined system pipelines and associated structures, or any portions thereof, including but not limited to sludge, grit, sediment, dirt, sand, rock, grease, roots and other liquid, solid or semi-solid materials contained therein, shall be considered "Special Wastes." In addition, any excavated soils contaminated in any manner, as designated by the Owner and/or Engineer, shall also fall under this category and shall be handled the same. When so encountered, all such materials and debris shall be removed to the extent so ordered by the Engineer and properly disposed of in strict compliance with the requirements of the MA DEP and other regulating authorities to an approved and certified waste disposal site. It shall remain the sole responsibility of the Contractor to apply for and obtain all required permits, bonds and/or insurance relative to such disposal. The Contractor shall also pay all costs associated with the disposal, required permits, bonds and insurance with no additional expense to the Owner. All handling of such "Special Waste" shall be done in strict compliance with the MA DEP requirements and/or any other federal, state or local agency

having jurisdiction or authority over the same. Under no circumstances shall sewage, solids or other "Special Wastes" removed from the sewer lines be dumped or spilled onto the streets or into ditches, catch basins or storm drains. The Contractor must use watertight and State approved vehicles in transporting any wastes as hereinbefore designated.

- B. The Contractor shall indemnify and save harmless the Owner and Engineer and all persons acting for or on behalf of the Owner and Engineer from all claims and liability of any nature or kind, and all damages, costs and expenses, including attorney's fees and penalties, arising from the improper handling, transportation or disposal of "Special Wastes" as determined by the MA DEP and/or any other federal, state or local agency having jurisdiction or authority over the same.

3.13 DUST CONTROL

- A. During the progress of the Work, maintain the area of activities, by sweeping and sprinkling of streets to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

3.14 BRIDGING TRENCHES

- A. Provide suitable and safe bridges and other crossings where required for the accommodation of travel, and to provide access to private property during construction. Remove once bridges and crossings are no longer needed.

3.15 FIELD QUALITY CONTROL

- A. Site Tests
 - 1. In accordance with SECTION 01410

3.16 CARE AND RESTORATION OF PROPERTY

- A. Restoration of existing property or structures done as promptly as practicable and not left until the end of the construction period.

END OF SECTION

SECTION 02210

ROCK EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for removal and disposal of rock.

B. Related Sections

1. Section 00500-Agreement
2. Section 00800- Supplementary Conditions
3. Section 02200-Earth Excavation, Backfill, Fill and Grading

1.02 DEFINITIONS

- ###### A. Rock-as defined in SECTION 00500.

1.03 REQUIREMENTS

- ###### A. Excavate rock if encountered, to the lines and grades indicated on the drawings or as directed, dispose of the excavated material, and furnish acceptable material for backfill in place of the excavated rock.
- ###### B. Excavate rock in pipe trenches to a limit which provides 6-inches clearance minimum from the pipe after it has been laid. Before the pipe is laid, the trench shall be backfilled to the correct subgrade with thoroughly compacted, suitable material or, when so specified or indicated on the drawings, with the same material as that required for bedding the pipe, furnished and placed at the expense of the Contractor.
- ###### C. The use of explosives will not be allowed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXCESS ROCK EXCAVATION

- ###### A. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below in this section.

- B. In pipe trenches, excess excavation below the elevation of the top of the bedding, cradle, or envelope shall be filled with material of the same type, placed and compacted in the same manner, as specified for the bedding, cradle, or envelope. Excess excavation above said elevation shall be filled with earth as specified in the article titled "Backfilling Pipe Trenches" in SECTION 02200.
- C. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with 3000 psi concrete. Other excess excavation shall be filled with earth as specified in the article titled "Backfilling Around Structures" in SECTION 02200.

3.02 SHATTERED ROCK

- A. If the rock below normal depth is shattered due to rock removal operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches screened gravel shall be used for backfill. All such removal and backfilling shall be done by and at the expense of the Contractor.

3.03 PREPARATION OF ROCK SURFACES

- A. Whenever so directed during the progress of the work, remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly, using steam to melt snow and ice, if necessary. Water in depressions shall then be removed as required so that the whole surface of the designated area can be inspected to determine whether seams or other defects exist.
- B. The surfaces of rock foundations shall be left sufficiently rough to bond well with the masonry and embankments to be built thereon, and if required, shall be cut to rough benches or steps.
- C. Before any masonry or embankment is built on or against the rock, the rock shall be scrupulously freed from all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means shall be used to accomplish this cleaning. Remove free water left on the surface of the rock.

3.04 REMOVAL OF BOULDERS

- A. Remove piles of boulders and loose rock encountered within the limits of earth embankments and dispose in a suitable place.

3.05 DISPOSAL OF EXCAVATED ROCK

- A. All excavated rock shall be handled, transported and disposed of by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him without additional cost to the Owner.
- B. Excavated rock may be used in backfilling trenches subject to the following limitations:

1. Pieces of rock larger than permitted under the article titled "Backfilling Pipe Trenches" in SECTION 02200 shall not be used for this purpose.
 2. The quantity of rock used as backfill in any location shall not be so great as to result in the formation of voids.
 3. Rock backfill shall not be placed within 36 in. of the surface of the finish grade.
- C. Surplus excavated rock shall be disposed of as specified for surplus excavated material as specified in SECTION 02200.

3.06 BACKFILLING ROCK EXCAVATIONS

- A. Where rock has been excavated and the excavation is to be backfilled, the backfilling above normal depth shall be done as specified in SECTION 02200. If material suitable for backfilling is not available in sufficient quantity from other excavations, the Contractor shall, at his own expense, furnish suitable material from outside sources.

END OF SECTION

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SECTION 02215

AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and placing materials, which include Crushed Stone, Gravel Borrow and Select Borrow.
2. Location of specified materials as detailed on the Drawings or as directed by the Engineer for excavation below normal depth, utility support, replacement of unsuitable material or elsewhere, as ordered.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading.
2. Section 02500 - Paving

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO).

1. T11, Amount of Material Finer than 0.075 mm Sieve in Aggregate
2. T27, Sieve Analysis of Fine and Coarse Aggregates.

B. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).

1.03 DEFINITIONS

- ###### A. The term Screened Gravel as used in the Contract Documents shall mean Crushed Stone.

1.04 SUBMITTALS

A. Shop Drawings

1. Provide sieve analysis when gradation requirements are given in the Specification.

B. Samples

1. Furnish representative sample including location of source with Shop Drawing transmittal sheet.

1.05 QUALITY ASSURANCE

A. Field Samples

1. The attention of the Contractor is directed to the fact that under Specification SECTION 00700, 1.03 Materials and Equipment, all materials furnished by the Contractor to be incorporated into the Work shall be subject to the inspection of the Engineer. The

Engineer shall be the sole judge as to the acceptability of proposed materials and said judgement shall be final, conclusive, and binding.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. In accordance with Specification SECTION 00700, 1.03 Materials and Equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone

1. For bedding and pipe zone material for pipe larger than 3 inches diameter. Well graded in size from 3/8 inches to 3/4 inches or such other sizes as may be approved.
2. For bedding and pipe zone material for plastic pipe 3 inches diameter and less, maximum particle size shall be 3/8 inches.
3. Clean, hard, and durable particles or fragments, free from dirt, vegetation, or other objectionable matter, and free from an excess of soft, thin elongated, laminated or disintegrated pieces.
4. Screened Stone of similar size and grading to this specification may be used instead of Crushed Stone.

B. Gravel Borrow

1. Granular material well graded from fine to coarse with a maximum size of 3 inches, obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted.
2. Gravel shall not contain vegetation, masses of roots, or individual roots more than 18 inches long or more than 1/2 inches in diameter.
3. Gravel shall be substantially free from loam and other organic matter, clay and other fine or harmful substances.
4. Gradation requirements for gravel shall be determined by AASHTO-T11 and T27 and conform to the following:

<u>Sieve</u>	<u>Percent Passing</u>
1/2 inch	60-95
No. 4	50-85
No. 50	8-28
No. 200	0-8

C. Select Borrow

1. Use inorganic natural soils and/or rock, having not more than 8 percent by weight passing the No. 200 sieve and having a maximum stone size no greater than 6-inches.
2. Use only material well-graded throughout entire size range, free of roots, leaves and other organic material, ice or frost and aggregations of frozen soil particles.
3. Moisture content to be within plus minus 3 percent optimum at the borrow source.
4. Material must meet compaction requirements indicated or as specified.

D. Gravel Base Course

1. In accordance with SECTION 02500.

2.02 SOURCE QUALITY CONTROL

A. Test, Inspection

1. Engineer may elect to sample material supplied at the source.
2. Assist the Engineer and/or personnel from the designated testing laboratory in obtaining samples.

PART 3 EXECUTION

3.01 INSTALLATION

A. Crushed Stone

1. Spread in layers of uniform thickness not greater than 6 inches.
2. Compact thoroughly by means of a suitable vibrator or mechanical tamper.

B. Gravel Borrow

1. Spread in layers of uniform thickness not exceeding 12 inches before compaction and moistened or allowed to dry as directed.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment.
3. Compaction shall conform to 95% of minimum dry density per ASTM D1557.
4. The percolation rate for the compacted bank-run gravel shall not exceed 5 minutes per inch.

C. Select Borrow

1. Spread in layers of uniform thickness not exceeding 12 in. (loose lift) before compaction and moistened or allowed to dry.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment unless otherwise directed by the Engineer.

3.02 FIELD QUALITY CONTROL

A. Material and compaction testing

1. In accordance with SECTION 01410.

END OF SECTION

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SECTION 02224

CONTROLLED DENSITY FILL (MASSACHUSETTS)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for controlled density fill (CDF) to be used in place of compacted soil for general backfill of trenches and/or excavations.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M 85 - Standard Specification for Portland Cement (Chemical and Physical)
2. AASHTO M 295, Class F - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

B. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any materials.

1. Massachusetts Department of Transportation Highway Division (massDOT), Standard Specifications for Highways and Bridges, 1988 Edition, including all addenda, issued by the State of Massachusetts Department of Transportation, (referred to as the Standard Specification).

1.03 DEFINITIONS

A. Controlled Density Fill, also known as "Flowable Fill" is a flowable, self-consolidating, rigid setting, low density material that can substitute for compacted gravel in backfills, fills and structural fills.

B. The two main categories of CDF's are Excavatable and Non-excavatable, with sub categories of flowable and very flowable.

C. Categories of CDF's:

1. Type 1 Very Flowable, non excavatable,
2. Type 1E Very Flowable, excavatable,
3. Type 2 Flowable, non excavatable,
4. Type 2E Flowable, excavatable.

D. Excavatable mixes shall be hand tool excavatable.

E. Very Flowable shall have very flowable characteristics for distances and small hard to reach areas.

1.04 DESIGN REQUIREMENTS

- A. Provide a mixture of Portland cement, aggregates, water and mineral admixtures with a low cement content and high slump to reduce strength development for possible removal and minimize settlement after placement.
- B. The proposed mix should maximize the flow characteristics of the material while producing the necessary strength.
- C. The mixes shall have the following design strengths:
 - 1. Non excavatable fill,
 - a. Type I (very flowable) and Type 2 (flowable),
 - b. Compressive strength at 28 days = 30 to 150 psi, 200 psi maximum at 90 days.
 - 2. Excavatable fill,
 - a. Type 1E (very flowable) and Type 2E (flowable),
 - b. Compressive strength at 28 days = 30 to 80 psi, 100 psi maximum at 90 days.
- D. Specific compressive strength(s) for structural applications are noted on the Contract Drawings.
- E. Slump
 - 1. Standard method = 10 to 12-inches.
 - 2. Modified method consisting of a six inch long by three inch inside diameter straight tube of non-porous material = 9 to 14-inches.

1.05 PERFORMANCE REQUIREMENTS

- A. Provide fill of homogeneous structure which when cured, will have the required strength, water tightness, and durability. To this end, it is essential that careful attention be given to the selection of materials, mixtures, placing and curing of the fill.

1.06 SUBMITTALS

- A. In accordance with Section 01300, submit the following,
 - 1. Mix design data not limited to, but including maximum and minimum strengths, air content, setting times, flowability and yield.
 - 2. Certification by the supplier stating compatibility with the project requirements and the Contractor's installation methods.

1.07 QUALITY ASSURANCE

- A. Furnish the supplier with information as to the intended use of the CDF.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland cement,

1. In accordance with AASHTO M85.
- B. Fly Ash (very flowable),
 1. In accordance with AASHTO M295, Type F.
- C. Sand,
 1. In accordance with Standard Specification M4.02.02
- D. Water,
 1. Clean and potable.
- E. Air entraining admixtures,
 1. In accordance with Standard Specification M4.02.05.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall follow the guideline set forth in ACI 229, except non standard materials shall not be used.

3.02 PREPARATION

- A. Pipes and all other members to be encased in CDF shall be temporarily secured in place to prevent displacement during fill placement.
- B. To reduce hydrostatic pressure and limit displacement potential, Contractor may use a high air generator in the fill mixture to lower unit weights.
- C. Pre-job test all pump applications prior to day of placement with actual equipment.
- D. Secure site during the placement for the CDF. Cautions include but are not limited to barricades, fences, lights and steel plates.
- E. Work shall be sequenced so as to keep traffic flowing within the project area.

3.03 INSTALLATION

- A. CDF shall be batched at concrete plants and hauled to job sites in ready-mix trucks with continuous agitating drums and be discharged with slumps as indicated.
- B. During waiting period prior to discharge, truck drums shall agitate mixture.
- C. CDF shall be installed in accordance with supplier's recommendations, be flowable and require no vibration.

3.04 FIELD QUALITY CONTROL

- A. All CDF to be used in the work shall be subject to testing to determine whether it conforms to the requirements of the specifications. The methods of testing shall be in accordance with the Standard Specification, and as approved by the Engineer.
- B. The place, time, frequency, and method of sampling will be determined by the Engineer in accordance with the particular conditions of this project.

3.05 PROTECTION

- A. Open excavations containing uncured CDF shall not be left uncovered overnight.

END OF SECTION

SECTION 02272

GEOTEXTILE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for installation of geotextile filter fabric in trenches and under riprap.

B. Related Sections

1. Section 02100 - Site Preparation
2. Section 02200 – Earthwork
3. Section 02215 – Aggregate Materials

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D3786, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method
2. D4355, Test Method for Deterioration of Geotextiles From Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
3. D4491, Test Method for Water Permeability of Geotextiles by Permittivity
4. D4533, Test Method for Trapezoid Tearing Strength of Geotextiles
5. D4632, Test Method for Grab Breaking Load and Elongation of Geotextiles
6. D4751, Test Method for Determining Apparent Opening Size of a Geotextile
7. D4833, Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
8. D5261, Measuring Mass Per Unit Area of Geotextiles.
9. D6241, Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.03 QUALITY ASSURANCE

A. General

1. Producer of fabric to maintain competent laboratory at point of manufacture to insure quality control in accordance with ASTM testing procedures.
2. Laboratory to maintain records of quality control results.

1.04 SUBMITTALS

A. Shop Drawings

1. Submit in accordance with SECTION 01300
2. Include manufacturer's recommended method of joining of adjacent fabric panels.

B. Certificate of Conformance

1. Upon each shipment/delivery of product to the work site, furnish mill certificate(s) from the company manufacturing the fabric attesting that the fabric meets the chemical, physical, manufacturing and performance requirements specified. Fabric will be rejected if it is found to have defects, rips, flaws, deterioration or other damage.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Provide fabric in rolls wrapped with a heavy-duty protective covering to protect fabric from, mud, dirt, dust, debris and other deleterious sources until it is installed. Label each roll of fabric with number or symbol to identify production run.
- B. Do not expose fabric to ultraviolet radiation (sunlight) for more than 20 days total in period of time following manufacture until fabric is installed and covered.
- C. If Engineer determines material is damaged in any way or has excessive sunlight exposure, the Contractor shall immediately make all repairs and replacements as directed by the Engineer, at no additional cost to the Owner.

1.06 SCHEDULING

- A. Schedule Work so that the covering of the fabric with a layer of the cover material is accomplished immediately after inspection and approval of the placed fabric by the Engineer. Failure to comply with this requirement shall require replacement of the fabric.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER/MATERIAL

- A. The geotextile fabric shall be nonwoven polypropylene designated as MIRAFI 140N as manufactured by US Fabrics, Cincinnati, Ohio; or acceptable equivalent and shall meet the following minimum requirements:

Minimum <u>Property (Unit)</u>	<u>Unit</u>	<u>Test Method</u>	<u>Requirements</u>
Weight	oz/sy	ASTM D5261	4.5
Grab Tensile Strength	lbs	ASTM D4632	120
Grab Tensile Elongation	%	ASTM D4632	50
CBR Puncture Strength	lbs	ASTM D6241	310
Trapezoid Tear Strength	lbs	ASTM D4533	50
Apparent Opening Size (AOS)	US Std. Sieve (mm)	ASTM D4751	70 (0.21)
Permittivity	sec ⁻¹	ASTM D4491	1.7
Permeability	cm/sec	ASTM D4491	0.22
Flow Rate	gal/min/sf	ASTM D4491	135
Ultraviolet Resistance (strength retained at 500 hrs)	%	ASTM D4355	70

- B. To keep the number of overlay joints to a minimum, fabric shall be provided in sections not less than fifteen (15) feet in width unless otherwise approved by the Engineer prior to delivery to the site.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. For Riprap

1. Prepared areas to receive geotextile in accordance with SECTION 02100 and SECTION 02200
2. Clear subgrade of all sharp objects, large stones, roots, debris, or any other foreign materials that may contribute to puncturing, shearing, rupturing or tearing of the geotextile.
3. Grade area as smooth as possible and compact in accordance with SECTION 02200, with a vibratory roller or other method approved by the Engineer.
4. Inspect subgrade and repair all unstable areas or soft spots with the installation of gravel and recompact prior to the placement of geotextile.

3.02 FABRIC INSTALLATION

A. For Riprap

1. Place at the locations shown on the Contract Drawings.
2. Unroll directly onto the prepared slope in a continuous manner. Join adjacent sections by overlapping the fabric a minimum of 12-inches. Join end sections by overlapping the fabric a minimum of 2-feet with field-sewn joints or as recommended by the manufacturer.
3. Place fabric on slopes creating a “shingled” effect in the direction of anticipated water flow.
4. Lay fabric smooth, maximizing surface contact with the prepared subbase, free of tension, stress, folds, wrinkles, or creases.
5. Securely anchor fabric sections at the top of the slope as recommended by the manufacturer. Use anchoring pins, nails, staples or other such means to secure fabric to the subbase surface to prevent fabric movement caused by wind uplift, and/or placement of cover material.
6. Maintain sufficient amount of cover material (minimum depth of 6-inches) to protect fabric during placement of riprap. Dozer buckets or blades, or other heavy or damaging equipment shall not be in direct contact with the fabric.
7. Minimize the height from which cover material is dumped and/or dropped directly onto the fabric material in order to avoid fabric damage or movement. Equipment used for spreading and compacting the cover material shall be of the type and size to avoid damage or movement to the underlying geotextile fabric.
8. Spread cover material in the direction of fabric overlap and in a manner that avoids creating undue tension, stress, sagging, buckling and/or other movement of the underlying fabric.

B. Fabric Installation in Trenches

1. In accordance with manufacturers recommendations
2. Place fabric in trench prior to placing crushed stone pipe bedding.
3. Overlap fabric 18-inches minimum for unsewn lap joints.
4. Do not permit equipment to travel directly on fabric.
5. Place fabric in smooth condition to prevent tearing or puncture.
6. Lay fabric loosely, without wrinkles or creases.
7. Leave slack in fabric to allow for adjustment.

3.03 PROTECTION

- A. Protect the work before, during and after installation, and protect the installed work covered by other Sections.

3.04 REPAIR

- A. Geotextile fabric damaged during installation shall be repaired by a piece of geotextile material cut, placed and adequately anchored over the damaged area, subject to a 3-foot minimum overlap requirement or as directed by the Engineer.
- B. If detrimental movement of the geotextile fabric occurs during any step of the installation, as determined solely by the Engineer, the Contractor shall remove the cover material and/or sections of fabric to the limits deemed necessary and reinstall the fabric.
- C. Any fabric damage during its installation or during placement of cover materials shall be replaced by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 02277

STRAW WATTLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to furnish and install straw wattles, as indicated on the Drawings and as herein specified.

1.02 SUBMITTALS

- A. In accordance with SECTION 01300 submit product details, manufacturers installation instructions and certifications.

1.03 STORAGE

- A. Store wattles off the ground and covered to protect from site construction damage, precipitation, sunlight (ultraviolet light), chemicals, open flames, sparks or other conditions which may damage the rolls.

PART 2 PRODUCTS

2.01 MATERIALS

A. Straw Wattles

1. Machine produced.
2. Straw filled tubes of compacted straw of rice, wheat or barley.
3. Straw wattles to be certified as weed free.
4. Netting for tubes to be seamless, high density polyethylene with ultra violet inhibitors.
5. Roll length to be 10.0 feet to 25.0 feet.
6. Weight per linear foot,
 - a. 12-inch: 2.5 lbs. minimum
 - b. 9-inch: 1.5 lbs. minimum
7. Stakes shall be wooden, 1 1/8-inch x 1 1/8-inch x 2.5 feet long, with lower ends tapered to facilitate driving into compacted soil. Rebar may be substituted for wooden stakes.

PART 3 EXECUTION

3.01 INSTALLATION

A. Straw Wattles

1. Install at locations indicated on the Drawings or as directed by the Engineer.
2. Remove all rocks, vegetation or other obstructions at straw wattle location.
3. Excavate a trench approximately 2 to 3-inches deep to accept the straw wattle and place straw wattle in trench.
4. Anchor straw wattle with stakes placed a maximum of 4-feet apart.
5. The end stakes shall be placed 6-inches from the end of straw wattle and angled toward previously laid straw wattle to force straw wattles together.
6. Refer to detail on Drawings for additional installation requirements.

3.02 MAINTENANCE

1. Maintain straw wattles throughout the duration of the project.
 - a. Damaged or displaced straw wattles shall be replaced by the Contractor at no additional cost to the Owner.
2. Remove sediments when depths accumulate to 50% of the depth of the straw wattle height, or as necessary.

3.03 REMOVAL AT PROJECT COMPLETION

- A. Remove all sediment collected by the straw wattle, remove the straw wattle, and restore the area to pre-construction condition to the satisfaction of the Engineer.

END OF SECTION

SECTION 02500

PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for construction of all temporary and permanent pavement on paved areas affected or damaged by the Contractors operations, whether inside or outside the normal trench limits, as indicated on the Drawings and as herein specified.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading

1.02 REFERENCES

- ###### A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

1. The Massachusetts Department of Transportation, Highway Division, Standard Specifications for Highways and Bridges, dated 1988, together with all errata addenda additional revisions, and supplemental specifications, all of which are hereinafter referred to as the MassDOT Standard Specifications.

1.03 PAVEMENT SCHEDULE

- ###### A. The Contractors attention is directed to the various pavements required under this contract, and their locations as detailed below.

- ###### B. All pavement thickness specified in this specification shall be of the thickness required after compaction.

1. Location: *Pumping Station Drive Ways*
Type: Flexible - 4"
Requirements: 12" Dense Graded/Gravel Sub-base Course
2" Bituminous Binder
2" Bituminous Surface
2. Location: *City Roads*
Type: Flexible - 6"
Requirements: 12" Dense Graded/Gravel Sub-base Course
4" Bituminous Binder
2" Bituminous Surface

PRODUCTS

1.04 MATERIALS

A. Asphalt Tack

1. Tack coat shall consist of emulsified asphalt, grade RS-1 or cutback asphalt, conforming to the requirements of the MassDOT Standard Specification Section M3.11.06.

B. Bituminous Base

1. Bituminous Base shall conform to the requirements of the MassDOT Standard Specification Section 420 and M3.11.00 for Base Course.

C. Bituminous Binder Trench Width (Permanent Pavement)

1. Bituminous Binder Course shall conform to the requirements of the MassDOT Standard Specification Section 420 and M3.11.00 for Binder Course.

D. Bituminous Surface, Trench Width (Permanent Pavement)

1. Bituminous Surface Course shall conform to the requirements of the MassDOT Standard Specification Section 460 and M3.11.00 for surface course Class I-1.

E. Bituminous Surface, Curb to Curb

1. Bituminous Surface Course shall conform to the requirements of the MassDOT Standard Specification Section 460 and M3.11.00 for surface course Class I-1.

F. Reinforced Concrete Base

1. Concrete Base shall conform to the requirements of the MassDOT Standard Specification, Section 430.

G. Bituminous Binder Trench Width (Temporary Pavement)

1. Temporary Pavement shall be Binder Course conforming to the requirements of the MassDOT Standard Specification Section 420 and M3.11.00 for Binder Course.

H. Dense-Graded Crushed Stone Sub-base Course (Temporary and Permanent)

1. The dense graded crushed stone sub-base course shall consist of coarse aggregates of crushed stone or gravel and fine aggregates of natural sand or stone screenings. Uniformly pre-mixed with a predetermined quantity of water and placed on the sub-base in close conformity with the lines and grades shown on the Contract Documents or established by the Engineer.
2. 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.
3. Coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test (AASSTO-T-96) of not more than 45.
4. Fine aggregate shall consist of natural or processed sand.
5. The composite material shall be free from clay, loam or other cohesive soil, and shall conform to the following grading requirements:

Sieve Designation Mesh Sieves	Percentage by Weight Passing Square
2 in.	100
1-1/2 in.	70-100

3/4 in.	50-85
No. 4	30-55
No. 50	8-24
No. 200	3-10

6. Sampling and testing shall be in accordance with the following standard AASHTO methods:

Sieve Analysis	T27
Passing No. 200 Sieve	T11

7. The dense-graded crushed stone sub-base course shall be spread and compacted in layers not to exceed 4 inches in compacted depth, to the same tolerances specified below for the gravel sub-base.
8. The dense-graded crushed stone sub-base course material shall meet the same requirements as specified in MassDOT Specification M2.01.7 except as noted above.

I. Gravel Sub-Base Course

1. The gravel sub-base course shall consist of Gravel Borrow Type b, (3-inches largest dimension) as specified in MassDOT Standard Specification Section M1.03.0
2. The gravel sub-base shall be spread and compacted in one layer, 8 inches in depth compacted measurement, to not less than 95 percent of the maximum dry density of the material, as determined by the Standard AASHTO Test Designation T99 compaction test Method C within 5% of optimum moisture content as determined by the Engineer. If the material retained on the #4 sieve is 50% or more of the total sample, this test shall not apply and the material shall be compacted to the satisfaction of the Engineer. The specific density of the Gravel Sub-base shall be maintained by determining the number of passes of a roller required to produce a constant and uniform density, after conducting a series of tests either using the sand/volume or the nuclear density-testing device.
3. Any stone with a dimension greater than 3 inches shall be removed from the sub-base before the gravel is compacted. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of 1/2-inch above or below the required cross sectional elevations and to a maximum irregularity not exceeding 1/2 inch under a 10 foot line longitudinally. Any specific area a gravel sub-base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced and recompactd by the Contractor without additional compensation.

1.05 SOURCE QUALITY CONTROL

- A. The paving plant used by the Contractor for preparation of bituminous paving materials shall be acceptable to the Engineer who shall have the right to inspect the plant and the making of the material as specified in MassDOT Specification M2.01.7 except as noted above.

PART 2 EXECUTION

2.01 PREPARATION

- A. Prior to placing pavement, all backfill shall have been properly compacted as specified under Section 02200 to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill. Backfill and gravel base course shall be compacted, brought to the

- proper elevation, and dressed so that new pavement construction shall be at the required grade. The Contractor shall maintain the surfaces of all excavated and disturbed areas until the pavement is placed. If there is a time lapse of more than 24 hours between completion of preparation of subgrade or placing of gravel base course and placing of paving, or if subgrade or gravel base course has been eroded or disturbed by traffic, the subgrade or gravel base course shall be restored before placing pavement.
- B. When installing permanent pavement on bituminous concrete roadway the edges of existing pavement shall be cut back 12-inches, or more as required, from the trench excavation wall or damaged area to sound undamaged material, straightened, cleaned, and painted with an accepted asphalt emulsion to ensure a satisfactory bond between it and the newly placed surface courses. Existing surface courses shall be stripped from the bituminous concrete base course for at least a 6-inch width and trimmed square and straight so that new permanent surfacing shall be placed on undisturbed bituminous concrete base course. Existing pavement shall be swept clean prior to placing any asphalt emulsion over it. Existing pavement that will be under new pavement shall be painted with asphalt emulsion to ensure a satisfactory bond.
 - C. Before permanent pavement is installed, the base shall be brought to the proper grade, and temporary pavement and excess gravel base shall be removed.
 - D. All manhole covers, catch basin grates, valve and meter boxes, curbs, walks, walls and fences shall be adequately protected and left in a clean condition. Where required, the grades of manhole covers, catch basin grates, valve boxes, and other similar items shall be adjusted to conform to the finished pavement grade.
 - E. The Contractor shall remove and acceptably dispose of all surplus and unsuitable material.

2.02 INSTALLATION

A. General

1. Unless indicated otherwise, all permanent bituminous pavement shall be installed in two courses or more. Bituminous base courses shall be carefully spread and raked to a uniform surface and thoroughly rolled before application of the top course.
2. All top courses of permanent paving shall be applied with acceptable mechanical spreaders in widths of at least 9 feet.
3. The rolling for all bituminous and gravel base courses shall conform to the standards listed in the appropriate Subsection of the Standard Specification.
4. Pavement shall be placed so that the entire roadway or paved area shall have a true and uniform surface, and the pavement shall conform to the proper grade and cross section with a smooth transition to existing pavement.

B. Dense Graded Crushed Stone Base Course

1. The base course shall be placed to such depth that the furnished compacted base course is the depth as indicated on the Contract Drawings and specified herein.
2. The top of the base course shall be below the furnish grade a distance required to accommodate the compacted pavement material as indicated on the Contract Drawings and specified herein.
3. The base course as herein specified shall be 18-inches thick for flexible pavement and 6-inches thick for rigid pavement.

C. Temporary Pavement

1. Temporary pavement shall be placed over all trenches in paved areas where directed by the Engineer.
2. The Contractor, upon completing the backfilling and compaction of the trenches in the streets and the placing of the gravel base courses, shall be required to construct temporary pavement unless otherwise directed by the Engineer.
3. Temporary Pavement in Town or City roads shall be placed in one course and shall consist of 2-inch compacted thickness of hot bituminous mix, on a 12-inch compacted thickness gravel base as directed by the Engineer.
4. Temporary Pavement in State roads shall be placed in one course and shall consist of 3-inch compacted thickness of hot bituminous mix, on a 18-inch compacted thickness gravel base as directed by the Engineer.
5. The Contractor shall maintain temporary pavement in good repair and flush with the existing pavement at all times until the permanent pavement is placed.
6. The temporary pavement shall not be removed until 60 days after installation or until such time that the Engineer authorizes the placement of permanent pavement at an earlier time.

D. Bituminous Base:

1. Bituminous Base shall be used in city streets and parking areas as listed in Article 1.03 of this specification.
2. Bituminous Base shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the MassDOT Standard Specification and as detailed in the Contract Drawings.
3. Prior to placing bituminous base, all temporary pavement and sufficient gravel base course shall be removed, to proper depths as detailed in the Contract Drawings.

E. Reinforced Concrete Base:

1. Reinforced Concrete Base shall be used in the streets as listed in Article 1.03 of this specification.
2. Reinforced Concrete Base shall be 8-inch thick and installed in accordance with the requirements of the MassDOT Standard Specification.
3. Prior to placing reinforced concrete base, all temporary pavement and sufficient gravel base course shall be removed, to proper depths as detailed in the Contract Drawings.

F. Bituminous Binder

1. Bituminous Binder shall be used in the streets as listed in Article 1.03 of this specification.
2. Bituminous Binder shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the MassDOT Standard Specification and as detailed in the Contract Drawings.

G. Bituminous Surface

1. Bituminous Surface shall be used in the streets as listed in Article 1.03 of this specification.
2. Bituminous Surface shall be placed to the thickness as indicated in Article 1.03 of this Specification and installed in accordance with the requirements of the MassDOT Standard Specification and as detailed in the Contract Drawings.

H. Sidewalks, Driveways, Parking Lots and Curbing

1. Sidewalks, driveways, parking lots and curbing that are removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they are found immediately prior to the start of operations. Materials and methods used for such restoration shall be in conformance with the requirements of the MassDOT Standard Specification.
2. Where the trench location is in a sidewalk, the entire width of the sidewalk shall be replaced with new material. Side forms shall be set so as to obtain and preserve a straight edge along both sides of the walk.
3. Where trench is in a driveway, the driveway shall be repaved across its entire width with even edges.
4. Parking lots shall be repaved in accordance with Article 3.01 of this section.
5. Gravel base course under sidewalks and driveways shall not be less than 16 inches thick.

I. Surface Maintenance

1. During the guarantee period, the Contractor shall maintain the bituminous surface and shall promptly make good all defects such as cracks, depressions, and holes that may occur. At all times, the surfacing shall be kept in a safe and satisfactory condition for traffic. If defects occur in surfacing constructed by the Contractor, the Contractor shall remove all bituminous concrete and base course as is necessary to properly correct the defect. After removing bituminous concrete and base course, the Contractor shall correct the cause of the defect and replace the base course and bituminous concrete in accordance with these specifications.

END OF SECTION

SECTION 02610

MANHOLE REHABILITATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for the following work.
 - a. Replacing missing, loose, or broken brick masonry and mortar joints, and patching all holes, voids, and spalled areas.
 - b. Replacing all unsound, damaged, or missing manhole steps, as directed.
 - c. Sealing of the manhole to eliminate infiltration.
 - d. Replacing manhole frame and cover, as directed.
 - e. Applying coating materials.

B. Related Sections

1. Section 02149 Maintaining Existing Flows

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (ASSHTO)

1. AASHTO M91 - Red Sewer Brick Only Grade SS.

B. American Society for Testing and Materials (ASTM)

1. ASTM C32 - Specification for Sewer and Manhole Brick (Made from clay or shale).
Grade SS
2. ASTM C94 - Specification for Ready-Mixed Concrete.
3. ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars
(Using 2-inch or 50-mm Cube Specimens).
4. ASTM C144 - Specification for Aggregate for Masonry Mortar.
5. ASTM C150 - Specification for Portland Cement.
6. ASTM C207 - Specification for Hydrated Lime for Masonry Purposes.
7. ASTM C267 - Test Method for Chemical Resistance of Mortars, Grouts, and Monolithic
Surfacings and Polymer Concretes.
8. ASTM C293 - Test Method for Flexural Strength of Concrete (Using Simple Beam With
Center-Point Loading)
9. ASTM C321 - Test Method for Bond Strength of Chemical-Resistant Mortars.
10. ASTM C496 - Test Method for Splitting Tensile strength of Cylindrical Concrete
Specimens.
11. ASTM C596 - Test Method for Drying Shrinkage of Mortar Containing Hydraulic
Cement.
12. ASTM C666 - Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

13. ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
14. ASTM C882 - Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

C. National Association of Sewer Service Companies (NASSCO)

1. NASSCO Recommended Specifications for Sewer Collection System Rehabilitation.

1.03 SUBMITTALS

A. Submit in shop drawings accordance with Specification Section 01300.

1. Product Data: Provide data on grouting, plugging, patching, coating and lining materials; manhole steps; mortar components; manhole frames and covers, as applicable; and sewer brick.
2. Mortar design mix.
3. Manufacturer's preparation/mixing/installation/application instructions for grouting, plugging, patching, coating and lining materials.
4. Outline of the procedures proposed for the accomplishment of work. Include a detailed description of the means and methods, and equipment to be used for each operation.

1.04 QUALITY ASSURANCE

- A. The materials used to plug, patch, coat and line manholes shall comprise of a system specifically recommended by the manufacturer for sanitary sewer manhole rehabilitation.
- B. Perform general work in accordance with NASSCO Recommended Specifications for Sewer Collection System Rehabilitation.

1.05 QUALIFICATIONS

- A. Installer: Company specializing in performing the work described in this Section shall demonstrate by documentation to the Engineer a minimum of three (3) years documented experience. The installer shall be a fully licensed applicator by the applicable manufacturer. The installer shall also be required to furnish a minimum of five (5) references where selected products have been successfully utilized under similar conditions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600 and in strict accordance with the manufacturer's recommendations/instructions.
- B. Maintain packaged materials clean, dry and protected against dampness, freezing, foreign matter and/or any other compromising conditions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Brick

1. Sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Brick shall comply with ASTM C32 and AASHTO M91 for sewer brick type S.S.
2. Rejected brick shall be immediately removed from the work.

B. Mortar for Brickwork

1. Composed of portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volume of cement and lime. The proportions of cement and lime shall be 4:1.
2. Cement shall be Type II Portland cement conforming to ASTM C150.
3. Hydrated lime shall be Type S conforming to ASTM C207. Hydrated lime shall be "Mortaseal" manufactured by US Gypsum, "4X Hydrate" manufactured by the New England Lime Company or an acceptable equivalent product.
4. Sand shall conform to ASTM C144.

C. Manhole Steps

1. Steel reinforced copolymer, polypropylene plastic with flexible "fins" designed to flex on insertion into manhole wall but to catch and hold upon any attempt to pull them out. Manhole steps shall be as manufactured by M.A. Industries Inc., Peachtree City, GA or an acceptable equivalent product.
2. Manhole steps are to be cut and ground flush with the manhole wall and will not be replaced.

D. Manhole Frames and Covers

1. Owners standard or as detailed on the Drawings.

E. Patching Material

1. Patching material shall be a rapid-setting, fiber reinforced, high-early-strength, corrosion/sulfate resistant calcium aluminate based cementitious material shall be used as a patching material for making repairs in concrete, brick, or other masonry constructed structures. Material shall be mixed and applied in strict accordance with the manufacturer's recommendations and shall have the following minimum requirements:
 - a. Compressive Strength, ASTM C109: 1400 psi @ 6 hours
 - b. Bond, ASTM C321: 140 psi @ 28 days
 - c. Cement: Calcium Aluminate Cement
Sulfate Resistant
 - d. Applied Density: 105 ± 5 lbs per cubic foot
 - e. Shrinkage, ASTM C596: 0% @ 90% relative humidity
2. Patching material shall be Strong-Seal® QSR as manufactured by Strong Seal Systems Corporation, Pine Bluff, AK or an acceptable equivalent.

F. Infiltration Control Material

1. Infiltration control material shall be a rapid-setting, high-early-strength, cementitious material specifically formulated for leak control applications, stopping infiltrating groundwater and making repairs in concrete, brick, or other masonry constructed structures. Material shall be mixed and applied in strict accordance with the manufacturer's recommendations and shall have the following minimum requirements:
 - a. Compressive Strength, ASTM C109: 400 to 600 psi @ 1-hour
1,800 to 2400 psi @ 24-hours
 - b. Expansion, ASTM C827: 0.10-percent
 - c. Sulfate Resistance, ASTM C267: No weight loss after 15-cycles;
2,000 ppm
 - d. Freeze/Thaw Resistance, ASTM C666, Method A: 100 cycles
 - e. Placement time: Less than 1 minute
2. Infiltration control material shall be Strong-Plug® as manufactured by Strong Seal Systems Corporation, Pine Bluff, AK or an acceptable equivalent.

G. Grouting Material

1. Chemical Sealing Materials shall be made of Acrylamide base gel and shall meet or exceed the following requirements:
 - a. A minimum of 10% acrylamide base material by weight in the total sealant mix, higher concentration (%) of acrylamide base material may be used to increase strength or offset dilution during injection.
 - b. The ability to tolerate some dilution and react in moving water during injection.
 - c. A viscosity of approximately 2 centipose, which can be increased with additives.
 - d. A constant viscosity during reaction period.
 - e. A controllable reaction time from 10 seconds to 1 hour.
 - f. A reaction (curing), which produces a homogeneous, chemically non biodegradable gel.
 - g. The ability to increase mix viscosity, density and gel strength by the use of additives.
2. The Chemical sealing materials shall be AV100 Grout by Avanti International, Webster, TX, or an acceptable equivalent product.

H. Liner Material

1. Liner material shall be a spray-applied, acid resistant, calcium aluminate cementitious liner material blended of 100% pure fused calcium aluminate clinker and calcium aluminate cement, and reinforced with alkaline resistant fiberglass rods. Liner material shall be specifically formulated for use to form a structurally enhanced monolithic liner covering all interior substrate surfaces exposed to harsh hydrogen sulfide conditions as typically found in municipal sanitary sewer systems regardless of surface pH. Material shall be factory blended requiring only the addition of clean and potable water (per ASTM C94 laboratory procedures). Material shall be mixed and applied in strict accordance with the manufacturer's recommendations and shall have the following minimum requirements at 28-days:
 - a. Compressive Strength, ASTM C109: Greater than 9,000 psi
 - b. Tensile Strength, ASTM C496: Greater than 800 psi
 - c. Flexural Strength, ASTM C293: Greater than 1,200 psi
 - d. Shrinkage, ASTM C596: 0% @ 90% Relative Humidity

- e. Bond, ASTM C882: Greater than 2,000 psi
 - f. Applied Density: 145 ± 5 lbs per cubic foot
 - g. Freeze/Thaw Resistance, ASTM C666: 100 cycles, no damage
2. Liner material shall be Strong-Seal® High Performance Mix as manufactured by Strong Seal Systems Corporation, Pine Bluff, AK or an acceptable equivalent.

PART 3 EXECUTION

3.01 REHABILITATION WORK

- A. Rehabilitate manholes as indicated and as specified herein.
- B. Rehabilitation includes sealing manholes to eliminate infiltration.
- C. Manhole sealing includes the following:
 - 1. Cleaning; surface preparation; stopping active leaks, applying patching/grouting materials as applicable to all holes or voids around steps, joints, or pipes and all spalled areas; and replacing missing bricks and re-pointing all missing and loose mortar joints.
 - 2. Applying coating/liner compounds and cementitious coating system to invert, bench, walls cone, corbel and chimney.

3.02 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of existing surfaces.

3.03 PREPARATION

- A. Bypass sewage flow to allow performance of the work. Provide the necessary pumps, conduits, and other equipment to divert the flow of sewage around the manhole in which work is to be performed. Handling existing sewage flows and bypass pumping shall be in accordance with Specification Section 02149.
- B. Prepare surfaces in accordance with mortar and coating manufacturer's instructions.
- C. Clean all concrete and masonry surfaces to be rehabilitated. Completely remove all sewage residue, grease, oil, laitance, coatings, loose bricks, mortar, unsound concrete and other foreign materials. Remove all cracked or disintegrated material to expose a sound subbase.
- D. All cracks not subject to movement and greater than 1/16 inch wide shall be routed out to a minimum width and depth of 1/2 inch.
- E. Remove and dispose of all solids and semi-solids resulting from the preparation operations in accordance with Specification Section 00700, 1.24, B.

- F. The primary means of cleaning the manhole shall be water blasting using high-pressure water only. Other methods such as dry sandblasting, acid-wash, concrete cleaners, degreasers or mechanical means may be required to properly clean the surface. All surfaces on which these other methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products.
- G. Water blast equipment shall utilize a minimum pressure of 5,000 psi and be capable of providing up to 10,000 psi of pressure when required. Muriatic acid (hydrochloric acid) solution, if used, shall be one part acid to ten parts water and shall be applied by spraying from above the manhole.
- H. After surface preparation and prior to application of mortars and coatings, infiltration shall be stopped by either plugging, chemical grout sealing, or channeled through "bleed" pipes installed at the bottom of the manhole.

3.04 CHEMICAL GROUT SEALING

- A. At each point of leakage within the manhole structure a hole shall be drilled from within the manhole and shall extend through the entire wall. In cases where there are multiple leaks around the circumference of the manhole, fewer holes may be drilled, providing all leakage is stopped from these holes.
- B. Install grout ports or sealant injection devices in these previously drilled holes in such a way as to provide a watertight seal between the holes and the injection device.
- C. Inject chemical grout into the installed ports under pressure using equipment appropriate for the particular application. The injection equipment shall consist of chemical pumps, chemical containers, injection packers, hoses, valves, and all necessary equipment required to seal manholes. The chemical injection pumps shall be equipped with pressure meters that will provide for monitoring pressure during injection of the chemical grout.
- D. Continue injection of grout until material refusal is recorded on the pressure gage of the pumping unit.
- E. Care shall be taken during the pumping operation to avoid excessive pressures that may damage the manhole structure.
- F. Upon completion of the injection remove the ports and fill the remaining holes with patching compound.

3.05 BLEED PIPES

- A. Drill holes and install "bleed" pipes around the bottom of the manhole wall to act as relief ports for water to flow from other active leaks to allow performance of the work.
- B. Remove bleed pipes and seal holes after all other manhole sealing work is complete.

3.06 PLUGGING COMPOUND

- A. Apply plugging compound in accordance with manufacturer's instructions.

3.07 PATCHING COMPOUND

- A. All material shall be mixed and applied in accordance with the manufacturers instructions.
- B. Installation to be performed by mechanics skilled in the application of the particular type of system.
- C. Prior to application, dampen area to be patched. Pack material into the area to be patched, troweling the minimum amount required to achieve a level finish. Allow adequate curing time.

3.08 BRICKWORK

- A. Only clean bricks shall be used. Bricks shall be moistened by suitable means, as directed, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
- B. Each brick shall be laid in a full bed and joint of mortar without requiring subsequent grouting, flushing, or filling, and shall be thoroughly bonded as directed.

3.09 MANHOLE STEPS

- A. Remove all unsound and damaged steps as directed by the Engineer.
- B. Drill holes to allow minimum of 3-inch embedment into the manhole wall or until the fins designed to catch are fully embedded.
- C. Clean holes by suitable means to remove all foreign matter such as dirt, oil, and grease.
- D. Fill all holes and voids with non-shrink grout. Work grout into space to eliminate voids.

3.10 MANHOLE FRAMES AND COVERS

- A. Remove and dispose of the cast-in-place concrete collar around the existing frame. Material in the exposed area shall be dug out to a depth sufficient to permit the required repairs.
- B. Remove the existing manhole frame and cover, and if specified herein and/or directed by the Engineer for full replacement, dispose of the existing frame and cover as directed. It shall be the responsibility of the Contractor, at no additional cost to the Owner, to repair any damage to the manhole chimney or corbel caused by the removal of the existing manhole frame and the reinstallation/replacement of the same.
- C. Frames shall be set concentric with the top of the masonry and fastened as indicated. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on the top of the bottom flange. The mortar shall be smoothly finished and have a slight slope to shed water away from the frame.
- D. Manhole covers shall be left in-place within the installed frames on completion of other work at the manholes.

3.11 INVERT REPAIR

- A. After preparation has been completed, remove all loose material and wash wall again.
- B. Any bench, invert or service line repairs shall be made at this time using the quick setting patching material (article 2.01) and shall be used per manufacturer's recommendations.
- C. Invert repair shall be performed on all inverts with visible damage or infiltration. After blocking flow through the manhole and thoroughly cleaning the invert, the quick setting patch material (article 2.01) shall be applied to the invert in an expeditious manner. The mix shall be troweled uniformly onto the invert at a minimum thickness of ½ inch, extending out onto the bench sufficiently to tie into the monolithic liner to be spray applied. The finished invert shall be smooth and free of ridges. The flow may be re-established in the manhole within 30 minutes after placement of the material.

3.12 CEMENTITIOUS LINER

- A. All material shall be mixed and applied in accordance with the manufacturers instructions.
- B. Installation to be performed by mechanics skilled and licensed by the manufacturer in the application of the particular type of system.
- C. Application of the cementitious liner shall be according to the manufacturers recommendations and as approved by the Engineer. Two coats of liner shall be applied with the minimum thickness of ½-inch per coat.

3.13 FINAL ACCEPTANCE

- A. After the specified types of rehabilitation work have been completed, visually inspect each manhole in the presence of the Engineer for full compliance with the Specifications including watertightness against leakage. Repair all visible leaks and defects observed during inspection. Final acceptance of the completed work shall be determined solely on an acceptable concurrence by the Owner/Engineer.
- B. The Owner/Engineer reserves the right to re-inspect the rehabilitated manholes at any time during the warranty period. During such inspections should there be any leakage and/or other defects found in the work the Contractor shall fully correct the elements of work in question as determined by the Owner/Engineer within thirty (30) days at no additional cost to the Owner.

END OF SECTION

SECTION 02618

DUCTILE-IRON PIPE AND FITTINGS FOR BURIED SERVICE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to furnish, lay, joint, and test ductile-iron pressure pipe, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.

1.02 REFERENCES

- A. American Water Works Association (AWWA)/American National Standards Institute (ANSI)
 - 1. C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 - 2. C105/A21.5, Polyethylene Encasement for Ductile Iron Pipe Systems
 - 3. C110/A21.10, Ductile-Iron and Gray-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
 - 4. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings.
 - 5. C116, Protective Fusion Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
 - 6. C150/A21.50, Thickness Design of Ductile-Iron Pipe.
 - 7. C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast for Water.
 - 8. C153/A21.53, Ductile-Iron Compact Fittings, 3 inches through 64 inches for Water Service
 - 9. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe
 - 10. C600, Installation of Ductile-Iron Water Mains and Their Appurtenances
 - 11. C651, Disinfecting Water Mains
- B. American Society of Testing and Materials (ASTM)
 - 1. A536, Standard Specification for Ductile Iron Castings

1.03 SUBMITTALS

- A. In accordance with SECTION 01300 submit the following:
- B. Shop Drawings
 - 1. Piping layouts in full detail.
 - 2. Location and type of backup block or device to prevent separation.
 - 3. Schedules of all pipe, fittings, special castings, couplings, expansion joints, restrained joints and other appurtenances.
 - 4. Detailed disinfection plan consistent with AWWA C651.
- C. Certificates
 - 1. **Ductile Iron pipe and fittings shall be produced in the United States in accordance with the American Iron and Steel requirements of P.L. 113-76, the Consolidated Appropriations Act of 2014.**

2. Sworn certificates of shop tests showing compliance with appropriate standard.
- D. Manufacturer's Literature
1. Catalog cuts of joints, couplings, harnesses, expansion joints, restrained joints gaskets, fasteners and other accessories.
 2. Brochures and technical data of coatings and lining's and proposed method of application.

1.04 QUALITY ASSURANCE

- A. Pipe and fittings to be inspected and tested at the foundry as required according to ANSI Standards.
- B. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.
- C. Owner reserves right to perform visual and hammer test prior to installation.

PART 2 PRODUCTS

2.01 PIPE

- A. Ductile-Iron Pipe
 1. Designed in accordance with AWWA/ANSI C150/ A21.50.
 - a. Ductile iron pipe used for sewer force mains and water mains shall be cement lined thickness class 52 push-on or mechanical joint, size as indicated on the Drawings.
 - b. For sewer pipeline use a minimum thickness class 52 ductile iron pipe. **Gravity sanitary sewer pipe lines and fittings shall be ductile iron pipe lined with a ceramic-filled amine-cured epoxy, Protecto 401 by Indurall.** The lining thickness shall be 40 mils minimum. Application shall be performed by an applicator approved by the coating manufacturer, in accordance with manufacturer's instructions and under controlled conditions at the applicator's shop or the pipe manufacturer's plant. Applicator shall submit a certified affidavit of compliance with manufacturer's instructions and requirements specified herein.
 2. Manufactured in accordance with AWWA/ANSI C151/A21.51.
 - a. Unless otherwise indicated or specified, ductile-iron pipe shall be at least thickness Class 52
- B. Pipe For Use With Couplings
 1. As specified above except that the ends shall be plain (without bells or beads) cast or machined at right angles to the axis.

2.02 FITTINGS

- A. General
 1. Push-on or mechanical-joint fittings shall be all-bell fittings unless otherwise indicated or specified.
 2. Compact fittings in accordance with AWWA/ANSI C153/A21.53 and shall have a working pressure rating of 350 psi

- B. Nuts and Bolts
 - 1. Ductile Iron or Kor-10 steel T bolts and nuts or approved equal.
- C. Nonstandard Fittings
 - 1. Fittings having nonstandard dimensions and cast especially for this project shall be of acceptable design.
 - 2. Manufactured to meet the requirements of these specifications and shall have the same diameter and thickness as standard fittings, but their laying lengths and types of ends shall be determined by their positions in the pipelines and by the particular piping to which they connect.

2.03 ADAPTERS

- A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.04 JOINTS

- A. Push-On and Mechanical
 - 1. In accordance with AWWA/ANSI C111/A21.11.
 - 2. The plain end of push-on pipe shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
 - 3. Push-on and mechanical-joint pipe and fittings shall be provided with sufficient quantities of accessories conforming to AWWA/ANSI C111/A21.11.
- B. Restrained
 - 1. Location of restrained joints shall be based on Thrust Restraint Design for Ductile Iron Pipe (Second Edition), published by Ductile Iron Pipe Research Association.
 - 2. Restraining glands will be required on all fittings.
 - 3. Pipe, fittings and appurtenances for restrained joints shall be in accordance with AWWA/ANSI C153/A21.53. Only restraining glands which impart multiple wedging action against the pipe increasing its pressure as the pipe pressure increases will be allowed. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Twist off nuts shall be used to insure proper actuating of the restraining device.
 - 4. Mechanical joint restraint shall have a working pressure rating of at least 250 psi.
 - 5. Manufactured by EBAA Iron, Inc., Eastland, Texas, or equal.
- C. Gaskets
 - 1. Force main and water main gaskets shall be of a composition suitable for exposure to the product which the pipe is intended.
 - 2. Gravity sewer main gaskets shall have fluoroelastomer (FKM) gaskets, such as Viton gaskets, as manufactured by DuPont, or an acceptable equivalent.

2.05 COUPLINGS

A. Flexible Connections

1. Where flexible connections in the piping are specified or indicated on the drawings, they shall be obtained by the use of sleeve-type couplings, split couplings, or mechanical-joint pipe and/or fittings as herein specified.

B. Sleeve Type Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
 - a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
 - a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
4. Nuts and Bolts to be high strength, low alloy steel, unless noted otherwise.
5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
6. Provide with fusion bonded epoxy finish.
7. Conform to requirements of AWWA C219.

C. Solid Sleeve Couplings

1. Solid sleeve couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.
2. Couplings shall be ductile iron with gaskets of a composition suitable for exposure to the liquid within the pipe.

2.06 ACCESSORIES

A. Tapped Connections

1. Tapped connections in pipe and fittings shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
2. Where the size of the connections 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 a 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 permitted by the Engineer.
3. All drilling and tapping of cast-iron pipe shall be done normal to the longitudinal axis of the pipe; fitting 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.

2.07 POLYETHYLENE ENCASEMENT

- A. In accordance with AWWA C105.

2.08 FINISHES

A. Lining

1. Inside of sewer force main and water main pipe and fittings shall be coated with double thickness cement lining and bituminous seal coat conforming to AWWA/ANSI C104/A21.4.
2. Ductile iron pipe and fittings for the influent sewer shall be lined with a ceramic-filled amine-cured epoxy, Protecto 401 by Indurall. The lining thickness shall be 40 mils minimum. Application shall be performed by an applicator approved by the coating manufacturer, in accordance with manufacturer's instructions and under controlled conditions at the applicator's shop or the pipe manufacturer's plant. Applicator shall submit a certified affidavit of compliance with manufacturer's instructions and requirements specified herein.

B. Coating

1. Outside of pipe and fittings shall be coated with the standard bituminous coating conforming to AWWA/ANSI C151/A21.51

PART 3 EXECUTION

3.01 HANDLING

A. Pipe and Fittings

1. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any pipe or fitting which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.

3.02 CUTTING

A. Pipe

1. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.
2. Cut ends to be used with push-on joints shall be carefully chamfered to prevent cutting the gasket when the pipe is laid or installed.

3.03 INSTALLATION

A. Pipe and Fittings

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.

2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or required. Care shall be taken to ensure a good alignment both horizontally and vertically.
4. Pipe shall have a firm bearing along its entire length. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
5. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the tabulation titled PIPE DEFLECTION ALLOWANCES.

PIPE DEFLECTION ALLOWANCES

Maximum permissible deflection, in.*

<u>Size of pipe, in.</u>	<u>push-on joint</u>	<u>Mechanical joint</u>
4	19	31
6	19	27
8	19	20
10	19	20
12	19	20
14	11	13-1/2
16	11	13-1/2
18	11	11
20	11	11
24	11	9
30	11	9
36	11	8
42	7-1/2	7-1/2
48	7-1/2	7-1/2
54	5-1/2	--

*Maximum permissible deflection for 18-ft. lengths; maximum permissible deflections for other lengths shall be in proportion of such lengths to 18 ft.

6. When mechanical joint, push-on joint or similar pipe is laid, the bell of the pipe shall be cleaned of excess tar or other obstructions and wiped out before the cleaned and prepared spigot of the next pipe is inserted into it. The new pipe shall be shoved firmly into place until properly seated and held securely until the joint has been completed.

B. Castings

1. Castings to be encased in masonry shall be accurately set with the bolt holes, if any, carefully aligned.
2. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.

C. Temporary Plugs

1. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

D. Appurtenances

1. Valves, fittings and appurtenances shall be set and jointed as indicated on the drawings.

3.04 ASSEMBLING

A. Push-On Joints

1. Make up by inserting the gasket into the groove of the bell and applying a thin film of special nontoxic gasket lubricant uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe.
2. The chamfered end of the plain pipe shall be inserted into the gasket and then forced past it until it seats against the bottom of the socket.

B. Bolted Joints

1. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.
2. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.

C. Mechanical Joints

1. Surfaces against which the gasket will come in contact shall be thoroughly brushed with a wire brush prior to assembly of the joint. The gasket shall be cleaned. The gasket, bell, and spigot shall be lubricated by being washed with soapy water.
2. The gland and gasket, in that order, shall be slipped over the spigot, and the spigot shall be inserted into the bell until it is correctly seated.
3. The gasket shall then be seated evenly in the bell at all points, centering the spigot, and the gland shall be pressed firmly against the gasket.
4. After all bolts have been inserted and the nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint to the proper tension, preferably by means of a torque wrench.
5. The correct range of torque as indicated by a torque wrench and the length wrench (if not a torque wrench) used by an average man to produce such range of torque, shall not exceed the values specified in the tabulation titled TORQUE RANGE VALUES.

TORQUE RANGE VALUES

Nominal pipe size, <u>in. in.</u>	Bolt diameter, <u>ft.-lb.</u>	Range of torque, <u>in.</u>	Length of wrench,
3	5/8	40-60	8
4 thru 24	3/4	60-90	10
30, 36	1	70-100	12
42, 48	1-1/4	90-120	14

If the effective sealing of the joint is not attained at the maximum torque indicated above, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be over stressed to tighten a leaking joint.

D. Restrained Joints

1. Install in accordance with manufacturers written instructions.
2. Do not exceed manufacturer's permissible pipe deflection allowance.

- E. Piping Restraint: Restrain all fittings and restrain all PVC piping according to the following table.

4 inch Nominal Pipe Diameter			
Horizontal Bends	11.25°	22.5°	45°
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	2	4	7
Downstream	2	4	7
Vertical Bends	11.25°	22.5°	45°
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	3	6	12
Downstream	3	6	12
6 inch Nominal Pipe Diameter			
Horizontal Bends	11.25°	22.5°	45°
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	3	5	9
Downstream	3	5	9
Vertical Bends	11.25°	22.5°	45°
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	4	8	17
Downstream	4	8	17
8 inch Nominal Pipe Diameter			
Horizontal Bends	11.25°	22.5°	45°
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	3	6	12
Downstream	3	6	12
Vertical Bends	11.25°	22.5°	45°
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	6	11	22
Downstream	6	11	22

Assumptions:

- 1) Pipe material is Ductile Iron
- 2) Soil type is Silty Sand (SM)
- 3) Safety Factor is 2 to 1
- 4) Trench Type 3
- 5) Minimum depth of pipe is at 5 feet below grade
- 6) The Test Pressure is at 200 psi
- 7) 90 degree elbows are not to be used in vertical bend situations due to extreme forces.

1. Should conditions vary from those presented in the assumptions, consult Engineer for direction.

E. Sleeve-Type Couplings

1. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches
2. Soapy water may be used as a gasket lubricant.
3. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.

4. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.
5. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.
6. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed the manufacturers recommended values
7. After assembly and inspection and before being backfilled, all exterior surfaces of buried sleeve-type couplings, including the middle and follower rings, bolts, and nuts, shall be thoroughly coated with an approved heavy-bodied bituminous mastic. Care shall be taken and appropriate devices used to ensure that the undersides, as well as the more readily accessible parts, are well coated.

3.05 POLYETHYLENE ENCASEMENT

- A. When required, install in accordance with AWWA C105.

3.06 SOCKET PIPE CLAMPS, TIE RODS AND BRIDLES

- A. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, suitable pipe clamps, tie rods or bridles shall be provided. Bridles and tie rods shall be at least 3/4 in. diameter except where they replace flange bolts of smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The socket clamps, tie rods or bridles shall be coated with an approved bituminous paint after assembly or if necessary, prior to assembly.

3.07 PIPING SUPPORT (THRUST BLOCK)

- A. Where necessary, bends, tees, and other fittings in pipelines buried in the ground may be backed up with 3000 psi concrete placed against undisturbed earth where firm support can be obtained. If the soil does not provide firm support, then restraining devices shall be provided.

3.08 CLEANING

- A. Prior to the pressure and leakage tests, thoroughly clean piping of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

3.09 TESTING

- A. Except as otherwise directed, pipelines shall be given combined pressure and leakage tests in sections of approved length.
 1. Provide 24 hour notice to Engineer for all testing
 2. The Contractor shall make arrangements for procuring water for testing and be responsible for all associated fees.

- B. Furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gages, relief valves, other necessary equipment; and all labor required.
- C. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires.
- D. However, pipelines to be embedded in concrete shall be tested prior to placing of the concrete and exposed piping shall be tested prior to field painting.
- E. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary excavations and do the necessary backfilling and make the necessary taps. After completion of the tests, if directed by the Engineer, remove corporations and plug said holes.
- F. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.
- G. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe but not to exceed 200 psi. Do not apply this pressure to items of equipment known to be incapable of withstanding such pressure.
- H. If the Contractor cannot achieve the specified pressure and maintain it for a period of two hour with no additional pumping, the section shall be considered as having failed to pass the test. Allowable leakage over the two hour period shall be calculated per AWWA C-600 as summarized in the following table.

Hydrostatic Testing Allowance per 1,000 ft. of Pipe
(Loss in U.S. Gallons Following a 2 Hour Test)

Avg. Pipe Press. (psi)	Nominal Pipe Diameter					
	6 in.	8 in.	12 in.	16 in.	24 in.	36 in.
150	1.10	1.48	2.20	2.94	4.42	6.61
175	1.18	1.60	1.38	3.18	4.76	7.16
200	1.28	1.70	2.56	3.40	5.10	7.64

- I. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test and is considered acceptable by the Engineer.
- J. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirement.

K. All testing to be witnessed by the Engineer.

3.10 DISINFECTING AND FLUSHING

- A. The Contractor shall disinfect the lines carrying potable water.
- B. Furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in the AWWA Standard C651 except as otherwise specified herein.
- C. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.
- D. The dosage shall be such as to produce a chlorine concentration of not less than 10 PPM (mg/l) after a contact time of not less than 24 hours.
- E. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM (mg/l).
- F. Before disposing of the water used in disinfecting and flushing water mains thoroughly neutralize it through the application of a reducing agent, as referenced in AWWA C651.
- G. Dispose of the water used in disinfecting and flushing in an approved manner.
- H. Connection at cut ins shall be swabbed with 50 PPM solution of chlorine at locations when above methods are not possible.
- I. Bacteriological sampling and testing shall be done in accordance with AWWA C651 for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.
- J. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.

3.11 CONNECTION TO EXISTING WATER MAINS

- A. In general, connection to existing water mains will not be allowed prior to the new water main successfully passing pressure and bacteria tests that can be verified with written confirmation. Any exception to this requirement will be at the sole discretion of the Engineer and/or Owner.

END OF SECTION

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SECTION 02629

UNDERGROUND UTILITY MARKING TAPE

GENERAL

1.01 SECTION INCLUDES

- A. Requirements for furnishing and installing metallic (detectable) and non-metallic (non-detectable) marking tape over buried pipelines and conduits.

1.02 REFERENCES

- A. A.P.W.A. - American Public Works Association

1.03 SUBMITTALS

- A. Shop Drawings
 - 1. Submit in accordance with SECTION 01300 - SUBMITTALS
- B. Samples
 - 1. Provide samples of submitted products.

1.04 DESCRIPTION

- A. General
 - 1. Marking tape to be installed over all pipe lines and conduits installed under this Contract.
 - 2. Marking tape for non-ferrous pipe or conduits to be Detectable, magnetic type.
 - 3. Marking tape for ferrous pipe or conduits to be Non-detectable, non-magnetic type.
 - 4. Tape to be 6-inches wide.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Underground utility marking tape to be:
 - 1. Detectable: Magnatec by THOR Enterprises, Inc., Sun Prairie, WI.
 - 2. Non-detectable: Shieldtec by THOR Enterprises, Inc., Sun Prairie, WI.
 - 3. Or product deemed equal by the Engineer.

2.02 MATERIALS

- A. Detectable Underground Utility marking Tape
 - 1. Minimum overall thickness: 5.0 mil (0.005”).
 - 2. Aluminum foil core: 35 gauge (0.00035”) minimum.
 - 3. Foil visible from both sides of tape.
 - 4. Protective plastic jacket applied to both sides of foil.
 - 5. Jacket adhesive applied directly to the film and foil.
 - 6. No printing to extend to the edges of the tape.

7. No Dilutants, pigments or contaminants in the adhesive.
 8. Adhesive formulated to resist degradation by elements normally found in soil.
- B. Non-detectable Underground Utility marking Tape
1. Minimum overall thickness: 4.0 mil (0.004”).
 2. Polyethylene plastic film: 100% virgin, low density acid and alkali-resistant.
 3. Printing: Permanent, black, environmentally safe.
 4. Coloring: color-fast, lead free, organic pigments suitable for direct burial and prolonged exposure to the elements normally found in soil.
- C. Marking
1. Tape to printed with “BURIED *UTILITY* LINE BELOW”, replacing the word “*UTILITY*” with the word “WATER”, “SEWER”, “DRAIN”, “ELECTRIC”, “GAS”, or otherwise appropriate, repeating continuously every 30-inches max.
- D. Color Code in accordance with A.P.W.A. Standards as follows:
- | | |
|----------------------------------|---|
| 1. Safety Red | Electric power and high voltage lines |
| 2. High Visibility Safety Yellow | Gas and oil distribution/Transmission |
| | Dangerous materials/Steam |
| 3. Safety Alert Orange | Fiber optic/telephone/CATV |
| 4. Safety Precaution Blue | Water and irrigation lines |
| 5. Safety Green | Sewer/storm/sanitary systems, non-potable water |
| 6. Safety Brown | Force mains and effluent lines |
| 7. Alert Purple | Reclaimed and effluent re-use lines |

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install marking tape directly above the pipe line or conduit tape is to identify, approximately, 24-inches below the proposed finished grade.
- B. Install marking tape in accordance with manufacturers recommendations.
- C. Install marking tape over existing utilities disturbed by the Contractors operation.

END OF SECTION

SECTION 02642

WATER SERVICE CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for furnishing and installing potable water service connections.

1.02 SUBMITTALS

A. Shop Drawings

- 1. In accordance with Section 01300, submit manufacturer's specifications, catalog data, descriptive literature, illustrations, diagrams, etc.

1.03 REFERENCES

A. American Water Works Association (ANSI/AWWA)

- 1. ANSI/AWWA C800, Underground Service Line Valves and Fittings.

B. American Society for Testing and Materials (ASTM)

- 1. ASTM B88 – Standard Specification for Seamless Copper Water Tube.

PART 2 PRODUCTS

2.01 SERVICE CONNECTIONS

- A. All domestic water services 2-inch or less in diameter shall be replaced with Type K soft copper tubing, 1-inch minimum diameter or as indicated on Contract Drawings or as indicated on Contract Drawings, conforming to ASTM B-88-49, and have valve box installed and a new curb stop.

- B. Plastic services, as approved by the City, shall be polyethylene manufactured of PE3408 materials as defined in ASTM D3350. Polyethylene shall be blue plastic with a pressure class of 200 PSI. Dimensional and performance characteristics shall conform to the requirements of AWWA C901.

- C. 4-inch and larger services to be Cement Lined Ductile Iron, Class 52.

2.02 CURB STOPS

- A. Curb stops shall be a minimum of 1-inch, lead free brass manufactured by Mueller or approved equal.

- B. Ball valve type, ends as required to suit type of pipe or tubing to be connected, and a combined cap and tee handle and shall open **RIGHT** (clockwise) and a drain shall not be allowed.

2.03 CORPORATION STOPS

- A. Lead free brass manufactured by Mueller, or approved equal.
- B. Corporations for 1-inch installation shall be heavy pattern, solid plug, easy turning. The inlet shall be an AWWA (CC) thread.
- C. The 1 ½-inch and 2-inch corporations shall be of a ball valve type which incorporates Teflon seats to assure self-centering of a Teflon coated bronze ball. The corporation shall be easy turning and non-binding with AWWA (CC) inlet thread.
- D. Corporations subject to a sustained hydraulic pressure of 200 PSI. All saddles for 1 ½ and 2-inch corporations shall have stainless steel straps
- E. Outlet connections shall be of the type required to suit the pipe or tubing connected.

2.04 LINE FITTINGS

- A. If required, shall be standard three-part unions conforming to AWWA C800.
- B. Lead free brass manufactured by Mueller, or approved equal.

2.05 SERVICE BOXES

- A. Services boxes shall be a two hole top with “WATER” cast into the top. Boxes shall be asphalt coated, cast iron, sliding type. Erie type or equal with a 1” diameter telescoping top pipe section.
- B. The shaft shall be 2 ½” inside diameter with extension rod.

2.06 SERVICE SADDLE

- A. DI Water Main Connections: Model 317, double strap style, manufactured by Smith Blair, Inc., Texarkana, TX.
- B. CI Water Main Connections: Model 331, double strap style, manufactured by Smith Blair, Inc., Texarkana, TX.

PART 3 EXECUTION

- A. Water service and fire service connections shall be replaced from the water main corporation stop to the new curb stop and connected to the existing service. Remove and replace existing curb stop, remove service pipe from old main, tap new main, install new corporation stop, install copper water service and fire service connection between new main and new installed curb stop.

- B. Service shall be maintained as continuously as possible, coordinate shut down with property owner.
- C. Services shall be flushed before activating to avoid meter clogging.
- D. Service connections shall be free from leaks and may be pressure tested through the water main as directed by the Engineer.
- E. The Engineer must inspect all service connections under normal water main pressure prior to backfilling of the service trench to inspect for leakage.

END OF SECTION

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SECTION 02769

DISPOSAL OF MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for disposal of materials resulting from the cleaning of sewer pipes.

1.02 SUBMITTALS

- A. In accordance with Specification Section 01300, submit the following
 1. Outline of the procedures proposed to accomplish the work.
 2. Include a detailed description of disposal methods and locations of disposal.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.01 DISPOSAL PROCEDURES

- A. Material encountered in the cleaning of sewer lines and the existing wet well is considered “Special Waste” by **the Commonwealth of Massachusetts, Department of Environmental Protection (MADEP)**. The materials include sludge, sand, grit, debris, etc.
- B. The Contractor is required to test and dispose of any waste material removed from pipeline, manholes, etc. within the project area in accordance with State and Federal requirements. Testing of waste material will be at the Contractor’s expense.
- C. The materials being removed from the pipelines and manholes during the cleaning process shall be deposited in such a manner as to not endanger the public, plant personnel or persons performing the work. Such debris deposits may be of such nature, high in biological organic contents, or chemically aggressive that they will require proper disposal in a safe, health risk free, environment. The Contractor shall contact the Owner and Engineer and all agencies having jurisdiction thereof, for approval of debris disposal methods and locations of disposal, prior to disposing of any or all debris removed from pipe cleaning methods. All solids or semi-solids resulting from the cleaning operations shall be removed and satisfactorily disposed of off-site at the Contractor’s expense.
- D. Debris must be transported in a watertight vehicle. The Contractor must ensure that no water leaks from the vehicle in any manner during the transportation. The Contractor is solely responsible for any cleanup of debris on route to disposal at a licensed disposal facility. The Contractor is also responsible for the payment of any fines that are incurred as a result of any incident which occurs during the transportation and/or disposal of the contents of the vehicle.

- E. Disposal must be at a licensed facility that is regulated to accept and properly dispose of the debris that is normally expected to be in a wastewater collection system.

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to furnish and install the 10 foot high chain-link fence, gates, and accessories.

1.02 DESIGN REQUIREMENTS

- A. The fence shall be of the height indicated and shall have a top and bottom rail.
- B. Fence materials and installation shall meet or exceed the standards of the Chain Link Fence Manufacturers Institute, Columbia, MD., except as otherwise specified in this section; also fence materials shall meet or exceed Fed. Spec. RR-F-191G/GEN for Fencing, Wire and Post Metal (and Gates, Chain-link Fence Fabric, and Accessories), and shall conform to the ASTM Standards noted in this Specification.

1.03 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete.

1.04 REFERENCES

- A. Fed. Spec. RR-F-191/1A, Type V, for Fencing, Wire and Post, Metal (Chain-link Fence Fabric).
- B. American Society for Testing and Materials
 1. A392, Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
 2. F 626, Specification for Fencing Fittings
 3. F668, Standard Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Chain Link Fence Fabric.
 4. F669, Standard Specification for Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.
 5. F900, Standard Specification for Industrial and Commercial Swing Gates.
 6. F934, Standard Specification for Standard Colors for Polymer Coated Chain Link Fence Materials.
 7. F1043, Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework
 8. F1083, Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
 9. F1234, Protective Coatings on Steel Framework for Fences.
 10. F1664, Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain Link Fence.

1.05 SUBMITTALS

- A. Shop Drawings, submit in accordance with SECTION 01300.
 - 1. Include detailed information, specifications, sizes and dimensions for all materials, accessories, and finishes.
- B. Samples
 - 1. Submit samples of the fencing materials to be used, in accordance with the requirements of SECTION 01300.
 - 2. Each sample shall be identified by mark or tag.
 - 3. Samples to include:
 - a. 2-inch length of each type of post.
 - b. 2-inch length of each type of brace and railing.
 - c. 2-inch length of framework for gates.
 - d. 2-inch length of diagonal truss brace.
 - e. 2-inch length of tension wire.
 - f. Each type of fitting used at terminal posts.
 - g. Fittings used at line posts.
 - h. Fittings for the gate leaf frame.
 - i. Gate hinge.
 - j. Gate latch.
 - k. Stretcher bar, 2-inch length.
 - l. Bolt and nut fastener.
 - m. Fence fabric, 2 weaves, 2 meshes long.
 - n. Tie.
 - o. Padlock with key and steel chain, 6-inch length.
 - 4. Accompanying the samples, the Contractor shall submit a written statement that samples submitted comply with the requirements of these Contract Documents.
 - 5. Samples shall be submitted for review at least 30 days prior to fence installation.
- C. Quality Control Submittals
 - 1. Manufacturer's recommended installation instructions.
 - 2. Evidence of Supplier and installer qualifications.

PART 2 PRODUCTS

2.01 GENERAL

- A. Match style, finish, and color of each fence component with that of other fence components.
- B. All fittings, post, fence and gate framework, and all accessories shall be galvanized steel, then coated with PVC.

2.02 CHAIN LINK FABRIC

- A. Vinyl-coated steel chain link fabric shall be Class 2B thermally fused and bonded vinyl coated, woven wire, to a uniform square mesh measuring $2\pm 1/8$ -inches between its parallel sides. Galvanized core wire shall be No. 9 gauge, of good commercial quality steel and shall be uniformly galvanized with a zinc-coat-weight of at least 0.30 oz per sq. ft. The

galvanized wire shall then be coated with a molecular bonding layer and a minimum 20 mil vinyl coating, continuously extrusion-bonded (not sprayed or dipped) by a thermal extrusion-bonding process to insure a dense and impervious covering, free of voids and having a smooth and lustrous appearance. Unbonded coatings are not acceptable. The vinyl coating shall not be capable of being stripped from the wire with wire strippers. The wire shall be vinyl-clad before weaving and shall be free and flexible at all joints. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be coated with vinyl at the factory during the weaving process.

- B. Fabric shall measure 8-feet in height and be knuckled at top selvage and twisted and barbed at bottom selvage.
- C. Color of the PVC coating: Black, and shall match the color of the total fence system.

2.03 FENCE POSTS, RAILS AND BRACES

A. General

- 1. In accordance with ASTM F669, Heavy Industrial Fence.
- 2. Protective Coatings: Zinc Coating; ASTM F1234, Type A external and internal coating.
- 3. Color coating: ASTM F934, minimum 10 mils thickness of PVC over zinc coating to match color of chain link fabric.
- 4. All framework shall be SS-40 pipe.

B. Line Posts

- 1. 2.875 inch outside diameter steel pipe weighing not less than 4.64 lb. per ft.,

C. End, Corner, and Pull Posts

- 1. 4.00 inch outside diameter steel pipe weighing not less than 6.56 lb. per ft.,

D. Top and bottom railings and railings for top, middle and bottom braces between terminal posts and adjacent line posts.

- 1. 1 5/8 inch outside diameter steel pipe weighing not less than 1.84 lb. per ft.,

2.04 TENSION WIRE

- A. No. 7-gage, marcelled, coated steel wire conforming to ASTM A824 Type II Zinc coated Class 2, 1.20 oz/sf.

2.05 TIE WIRES

- A. 6 gage (outside diameter) galvanized steel wire for fastening fence fabric to line posts and rails.

2.06 STRETCHER BARS

- A. Flat bars with minimum cross section dimensions of not less than 3/16 inch by 3/4 inch.
- B. Not less than 2 inches shorter than height of the fabric with which they are to be used.

2.07 BANDS OR CLIPS

- A. Bar bends of not less than 11-gage sheet steel, $\frac{3}{4}$ inches wide for posts 4 inch OD or less and $\frac{7}{8}$ inches wide for posts greater than 4 inch OD, in accordance with ASTM F626, and bolted with $\frac{5}{16}$ inch diameter galvanized carriage bolts and nuts.

2.08 DIAGONAL TRUSS

- A. Use between terminal and adjacent line posts and for gate framework.
 - 1. $\frac{3}{8}$ inch diameter steel rod.

2.09 FITTINGS

- A. Malleable iron or pressed steel of suitable size to produce strong construction.
- B. Post Caps
 - 1. Accommodate passage of top rail.

2.10 GATES

- A. General
 - 1. In accordance with ASTM F900.
 - 2. Gate capable of being opened and closed easily by one person.
 - 3. Paint welded steel joints with zinc-based paint.
 - 4. Attach chain link fabric securely to gate frame at intervals not exceeding 15 inches.
- B. Gate posts for gate leaves up to and including 6 ft. wide.
 - 1. 2.875 inch outside diameter steel pipe weighing not less than 4.64 lb. per ft.,
 - 2. or 3.50 inch by 3.50 inch roll-formed, steel corner section weighing not less than 5.00 lb. per ft.
- C. Gate posts for gate leaves over 6 ft. up to and including 12 ft. wide.
 - 1. 4.00 inch outside diameter steel pipe weighing not less than 6.56 lb. per ft.,
- D. Gate Posts for gate leaves over 13 ft. wide and up to and including 18 ft. 6.625 in. outside diameter steel pipe weighing not less than 18.02 lb. per ft.
- E. Gate Leaf framework
 - 1. 2 inch outside diameter steel pipe weighing not less than 2.28 lb. per ft.
- F. Hinges
 - 1. Heavy pattern of adequate strength for the gate size.
 - 2. Large bearing surfaces for clamping or bolting in position.
- G. Gate Stops
 - 1. Mushroom type or flush plate with anchors, suitable for setting in concrete.
- H. Cantilever Sliding Gate

1. The cantilever sling gate shall be "freehanging" type, single leaf, and sized as shown on the Drawings. The gate manufacturer shall supply sliding gates of appropriate construction, which will be structurally stable and meeting the intended dimensions. The gate shall be manufactured by Anchor Fence/Master Halco Inc., Cyclone Fence, Page Fence, or approved equal.
2. The gate shall be provided with two roller truck assemblies, which operate within a combined track and top gate frame member. The roller truck assemblies shall provide vertical support and lateral movement control to insure alignment of the truck in the track. The roller truck assemblies shall be fastened to gate posts with 7/8-inch diameter ball bolts with 1/2-inch shank.
3. The gate frame shall be constructed of 2-inch square aluminum tubing alloy 6063-T6, weighing 0.94 lbs per linear foot, welded at the joints. The combined track and top frame member shall be extruded aluminum-sized per manufacturer's recommendations. The bottom frame member shall be 2-inch by 4-inch aluminum tubing weighting 1.71 pounds per linear foot.
4. Support posts for the cantilever slide gate shall be of 4-inch outside diameter, Schedule 40 steel pipe, ASTM A-120, as specified above.
5. Vertical uprights and diagonal truss rods shall be provided as necessary to insure rigidity of the gate frame and prevent sagging.
6. Appurtenant hardware including roller guide assemblies for each support post, latch assembly with provisions for padlocking, and gate stop assembly shall be provided.

I. Locking Mechanism

1. Provide with a suitable latch accessible from both sides and with provision for padlocking.
2. Double leaf swing gates shall have a center bolt, center stop, and automatic backstops to hold leaves in open position.
3. Padlocks
 - a. Solid brass cases.
 - b. Hardened steel shackles.
 - c. Removable core cylinders.
 - d. Galvanized steel chains attached to the shackle by a clevis.
 - e. Padlocks shall be manufactured by Eaton Corp Lock & Hardware Div., Yale Marketing Dept., Charlotte, N.C.; & P&F. Corbin, Div. of Emhart Corp., Berlin, Conn.; Best Universal Lock Co., Inc., Indianapolis, Ind.; or be an acceptable equivalent product.
 - f. Padlocks shall be furnished with four keys each.

2.11 FOUNDATIONS

- A. Concrete for post foundation bases shall be in accordance with SECTION 03300.
- B. Grout for posts set in solid rock shall consist of one part Portland cement and three parts of clean, sharp, well-graded sand with just enough water for proper workability.

PART 3 EXECUTION

3.01 GENERAL

- A. The fence and gates shall be erected by skilled mechanics.
- B. Any change in direction of the fence line of 30 degrees or more shall be considered corners. Pull posts shall be used at any abrupt change in grade.
- C. Maximum area of unbraced fence shall not exceed 1,500 square feet.
- D. Terminal posts shall be braced to adjacent posts with horizontal brace rails and diagonal truss rods brought to proper tension so that posts are plumb.
- E. There shall be no loose connections or sloppy fits in the fence framework. The fence framework shall withstand all wind and other forces due to the weather.

3.02 POST SETTING

- A. Post spacing shall uniform with maximum spacing of 10 ft. in fences erected along straight lines. All posts shall be placed plumb and centered in the concrete foundations.
- B. Post foundations in earth shall be concrete cylinders with a minimum diameter of 12 inches, crowned at grade to shed water, and shall not be less than 36 inches deep in the ground. Posts shall be set in the full depth of the foundations except for 3 inch of concrete under the posts.
- C. Coat portion of galvanized or aluminum-coated steel post that will be embedded in concrete with Bitumastic Super Service Black, manufactured by the Koppers Co.; 450 Heavy Themecol, manufactured by Tnemec Co., North Kansas City, MO; or an acceptable equivalent product. Extend coating to 1-inch above top of finished concrete.
- D. If foundation holes are excavated in peat or other unstable soil, the Engineer shall be notified for determination of suitable construction precautions.
- E. If solid ledge is encountered without overburden of soil, posts shall be set into the rock a minimum depth of 12 inch for line posts and 18 inch for terminal posts. Post holes shall be at least 1 inch greater in diameter than the post and the grout shall be thoroughly worked into the hole so as not to leave voids, and shall be crowned at the top to shed water. Where solid rock is covered by an overburden, the total setting depth shall not exceed the depths required for setting in earth, and the posts shall be grouted into the rock as described.

3.03 FENCE FABRIC

- A. Fabric shall be stretched taut and tied to posts, rails, and tension wires with the bottom edge following the finished grade not more than 2 inch above the grade. The fabric shall be installed on the security side of the fence and shall be anchored to the framework so that the fabric remains in tension after pulling force is released. The fabric shall be attached to line posts with tie wires spaced at not more than 15 inch intervals and to rails and braces at not

more than 24 inch intervals. The fabric shall be attached to the tension wire with hog ring ties on 24 inch centers.

3.04 GATES

- A. Gates shall be installed plumb, level, and secure for the full width of the opening and the hardware adjusted for smooth operation.

3.05 GATE OPERATOR SYSTEMS

- A. Install gate operator system in accordance with manufacturer's recommendations.
- B. Furnish with equipment and accessories necessary for complete installation.

3.06 ELECTRICAL GROUNDING

- A. Ground fences in accordance with applicable requirements of National Electric Safety Code.

END OF SECTION

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SECTION 02930

LOAMING AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for loaming, fertilizing, seeding, and related work in areas disturbed in the process of performing the Work under this contract.

1.02 SUBMITTALS

- A. In accordance with SECTION 01300 submit the following:
 - 1. Submit with seed, certificates confirming seed mixture, purity, germinating value, and crop year identification.
 - 2. Submit test samples of loam.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Fertilizer:
 - 1. Delivered mixed as specified in standard size, unopened containers showing weight, analysis, and name of manufacturer.
 - 2. Store in weather proof place.
- B. Seed:
 - 1. Delivered in original unopened containers with mixture listed.

PART 2 PRODUCTS

2.01 LOAM

- A. Fertile, natural topsoil, typical of locality, without admixture of subsoil, refuse or other foreign materials, and obtained from well-drained arable site. Mixture of sand, silt and clay particles in approximately equal proportions. Free of stumps, roots, heavy or stiff clay, stones large than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other deleterious matter.
- B. Not less than 4 percent nor more than 20 percent organic matter as determined by loss on ignition of oven-dried samples.
- C. Loam test samples dried to constant weight at temperature of 230 degrees. F., plus or minus nine degrees.
- D. Use loam, having prior vegetative growth that did not contain toxic amounts of either acid or alkaline elements.

2.02 LIME, FERTILIZER AND SEED

- A. Ground agricultural limestone containing not less than 85 percent of total carbonates.
- B. Complete fertilizer, at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight:

Nitrogen 10% Phosphorus 10% Potash 10%

- C. Turf grass seed, clean, high in germinating value and latest year's crop mixture as follows:

Name	Minimum Proportion by Weight	Percent Purity	Percent Germination
Kentucky bluegrass	20%	87%	85%
Merion Kentucky bluegrass	20%	87%	85%
Red Chewings fescue	45%	98%	85%
Italian rye	15%	98%	90%

PART 3 EXECUTION

3.01 GENERAL

- A. Supply suitable quantities of water, hose and appurtenances.

3.02 LOAM

- A. Spread loam on areas to 6-inch depth after compaction, fine grade and compact.

3.03 LIME, FERTILIZER AND SEEDING

- A. Apply lime by mechanical means at rate of 3000 pounds per acre.
- B. Apply fertilizer at rate of 1200 pounds per acre.
- C. Remove weeds or replace loam and reestablish finish grades, if any delays in seeding lawn areas and weeds grow on surface or loam is washed out prior to sowing seed and without additional compensation. Sow seed at rate of 175 pounds per acre on calm day, by mechanical means. "Hydro-Seeding" not permitted unless otherwise permitted or required by Engineer. Sow one-half of seed in one direction, and other half at right angles to original direction. Rake seed lightly into loam, to depth of not more than 1/4 inch and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.
- D. Water lawn areas adequately at time of sowing and daily thereafter with fine spray, and continue throughout maintenance and protection period.
- E. Seed during approximate time periods of April 1 to May 15 and August 15 to October 1, and only when weather and soil conditions are suitable for such work, unless otherwise permitted.

3.04 MAINTENANCE OF SEEDED AREAS

- A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing at least three times. Weed thoroughly once and maintained until time of final acceptance. Reseed and refertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.
- B. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.
- C. Repair or replace all seeded areas which, in judgment of Engineer, have not survived and grown in satisfactory manner, for a period of one year after acceptance.
- D. Seeding replacement, same seed mixture as specified and furnished and installed as specified.

3.05 TEMPORARY COVER CROP

- A. Sow a temporary cover crop of buckwheat, domestic rye grass or other acceptable seed if there is insufficient time in the planting season to complete seeding, fertilizing, and permanent seeding at the option of Contractor or order of Engineer. Cut and water cover crop as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into soil, the areas shall be fertilized and permanent seed crop sown as specified.

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DIVISION 03

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SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for forms to be used for all concrete masonry including footings, except as otherwise permitted.

B. Related Sections

1. Section 03200 - Concrete Reinforcement.
2. Section 03300 - Cast-In-Place Concrete.

1.02 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 350, Code Requirements for Environmental Engineering Concrete Structures
2. ACI 347R, Guide to Formwork for Concrete.

1.03 SUBMITTALS

A. Submit in accordance with Section 01300.

B. Shop Drawings:

1. Layout of panel joints, tie hole pattern, and form liners.
2. Form Ties - Tapered Through-Bolts: Proposed method of sealing form tie hole; coordinate with details shown.

C. Samples: One each as follows:

1. Form liners.
2. Form ties.

D. Quality Control Submittals:

1. Statements of qualifications for formwork designer.
2. Manufacturer's Certificate of Proper Installation. (After installation)

1.04 QUALITY ASSURANCE

- ###### A. Qualifications: Formwork, falsework, and shoring designs prepared by an engineer licensed in the State of Massachusetts.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Surfaces to be given burlap-rubbed finish.

1. Form surface in contact with the concrete shall be made of heavy gage metal, new plywood (used plywood which, in the opinion of the Engineer, is substantially equal to new plywood may be used), tempered wood fiberboards with smooth surface, or similar materials.
2. Metal forms or form linings shall have square edges so that the concrete will not have fins or fluting. Joints between form panels shall be well fitted so as to be tight and result in substantially flush concrete surfaces on opposite sides of the joints.
3. Forms shall not be pieced out by use of materials different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface.

B. Surfaces other than those to be given burlap-rubbed finish.

1. Forms shall be made of wood, metal, or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be reasonable good, as accepted. Metal forms shall be of an acceptable type for the work involved. Edges of forms in contact with concrete shall be flush within 1/16 in.

C. Forms shall be of suitable material, design, and construction as to be rigid, tight enough to prevent the passage of mortar, and plane surfaces shall be plane within 1/16 in. in 4 ft. Particular care shall be taken to ensure that forms are true to line where deviations in the concrete would be obvious or objectionable, as where building superstructures are to be built thereon, or where the tops of walls are exposed. All such deviations which may occur shall be corrected by, and at the expense of the contractor, as directed, even to the extent of tearing down and rebuilding the concrete.

D. Forms for walls, columns, or piers shall have removable panels at the bottom for cleaning, inspection, and scrubbing-in of bonding grout. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete, and so that construction joints can be properly keyed and treated.

E. Forms shall be sufficiently rigid to prevent displacement or sagging between supports, and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

F. Wall Forms and Underside of Slabs and Beams:

1. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle

board, or steel in “new and undamaged” condition, of sufficient strength and surface smoothness to produce specified finish. Use in combination with form liners where required.

G. All Other Forms: Materials as specified for wall forms.

H. Form Sealer:

1. Material: Surface sealer will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces, when applied to most forms of form liners. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulations and can be used in clean water treatment plants.

2. Manufacturer and Product: Master Builders, Inc.; Rheofinish; or Equal.

I. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material, compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces. Match the rustication grooves with the existing configuration and style located at the plant.

2.02 FORM TIES

A. Form ties to be encased in concrete shall not be made of through-bolts or commonwire, but shall be of a well-established type, so made and installed as to embody the following features:

1. After removal of the protruding part of the tie, there shall be no metal nearer than 1 in. to the face of the concrete.
2. The part of the tie which is to be removed shall be at least 1/2 in. in diameter, or if smaller, it shall be provided with a wood or metal cone 1 in. long placed against the inside of the forms. cones shall be carefully removed from the concrete after the forms have been stripped.
3. Ties which pass through walls subject to hydrostatic pressure shall be provided with acceptable water stops, such as washers, securely fastened to the ties.

B. Form Ties:

1. Material: Steel.
2. Spreader Inserts.
 - a. Conical or spherical type.
 - b. Design to maintain positive contact with forming material.
 - c. Furnish units that will leave no metal closer than 1 inch to concrete surface when forms, inserts, and tie ends are removed.
3. Wire ties not permitted.
4. Flat bar ties for panel forms, furnish plastic or rubber inserts with minimum 1 inch depth and sufficient dimensions to permit patching of tie hole.
5. Water Stop Ties: For water-holding structures, basements, pipe galleries, and accessible spaces below finish grade, furnish one of the following:
 - a. Integral steel water stop 0.103-inch thick and 0.625 inch in diameter tightly and continuously welded to tie.
 - b. Neoprene water stop 3/16-inch thick and 15/16 inch in diameter whose center

- hole is 1/2 diameter of tie, or a molded plastic water stop of comparable size.
- c. Water Stop: Oriented perpendicular to tie and symmetrical about center of tie.
- d. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.
- 6. Through-Bolts: Tapered minimum 1-inch diameter at smallest end.
- 7. Elastic Vinyl Plug: Design and size of plug to allow insertion with tool to enable plug to elongate and return to original length, and diameter upon removal forming a watertight seal.
 - a. Manufacturer and Product: Dayton Superior Co., Miamisburg, OH; Dayton Sure Plug, or equal.

PART 3 EXECUTION

3.01 SYSTEM DESIGN REQUIREMENTS

- A. Design formwork in accordance with ACI 347R and ACI 318 to provide the concrete finishes specified in Section 03300, CAST-IN-PLACE CONCRETE.
- B. Make joints in forms watertight.
- C. Limit panel deflection to 1/360 of each component span to achieve tolerances specified.

3.02 ERECTION

- A. General: Unless specified otherwise, follow the applicable recommendations of ACI347R.
- B. Forms shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, and to the elevations indicated on the drawings or specified, and exposed concrete will be substantially free from board or grain marks, poorly matched joints, and other irregularities or defects.
- C. Beveled Edges (Chamfer):
 - 1. Form 3/4-inch bevels at concrete edges, unless otherwise shown.
 - 2. Where beveled edges on existing adjacent structures are other than 3/4-inch, obtain ENGINEER's approval of size prior to placement of beveled edge.
- D. Wall Forms:
 - 1. Do not reuse forms with damaged surfaces.
 - 2. Locate form ties and joints in an uninterrupted pattern for smooth and uniform surface.
 - 3. Inspect form surfaces prior to installation to assure conformance with specified tolerances.
- E. Forms for Curbs, Sidewalks, and Driveways:
 - 1. Provide standard steel or wood forms to prevent movement.
 - 2. Set forms to true lines and grades, and securely stake in position.
- F. Form Tolerances: Provide forms in accordance with ACI 347R and ACI 318 and the following tolerances for finishes specified:

1. Wall Tolerances:
 - a. Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
 - b. Plumb within 1/4-inch to 10-feet.
 - c. Depressions in Wall Surface: Maximum 5/16-inch when 10-foot straightedge is placed on high points in all directions.
 - d. Thicknesses: Maximum 1/4-inch minus or 1/2-inch plus from dimensions shown.
2. Slab Tolerances:
 - a. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified.
 - b. Slab Finish Tolerances and Slope Tolerances: Crowns on floor surface not too high as to prevent 10-foot straight edge from resting on end blocks, nor low spots that allow a block of twice the tolerance in thickness to pass under the supported 10-foot straightedge.
 - c. Steel gauge block 5/16-inch thick.
 - d. Slab drainage.
 - 1) Finish Slab Elevation: Slope slabs to floor drain and gutter, and shall adequately drain regardless of tolerances.
 - 2) Thickness: Maximum 1/4-inch minus or 1/2-inch plus from thickness shown, except where thickness tolerance will not affect slope, drainage, or slab elevation.

3.03 FORM SURFACE PREPARATION

- A. Thoroughly clean form surfaces in contact with concrete or previous concrete, dirt, and other surface contaminants prior to coating surface.
- B. Exposed Wood Forms in Contact with Concrete: Apply form sealer as recommended by the sealer material manufacturer.
- C. Steel Forms: Apply form sealer to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust.

3.04 FORM COATINGS

- A. All forms shall be oiled with an acceptable nonstaining oil or liquid form coating before reinforcement is placed.
- B. Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged pieces repaired, and all projecting nails withdrawn.

3.05 REMOVAL OF FORMS

- A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed until the concrete has aged for the following number of day-degrees*:
 1. Formwork not supporting weight of concrete, (i.e., sides of beams, walls, columns, and similar parts of the Work) may be removed after cumulatively curing at not less than a total of three 50-degree F days after placing concrete,

provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing protection operations are maintained.

2. Leave forms and shoring for elevated structural slabs or beams in place, in accordance with ACI 318, Chapter 6, and until concrete has reached compressive strength equal to 80 percent of the specified 28-day compressive strength as determined by test cylinders.
3. *Day-degree: total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily average temperature of 60 deg. F. equals 300 day-degrees.

3.06 MANUFACTURER'S SERVICES

- A. Provide form manufacturer's representative at site for installation assistance, and inspection.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for reinforcing steel bars, wire fabric and accessories as shown on the drawings, specified herein, and as needed for a complete and proper installation.

B. Related Sections

1. Section 03100 - Concrete Formwork.
2. Section 03300 - Cast-In-Place Concrete.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. A82, Specification for Steel Wire, Plain for Concrete Reinforcement.
2. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. A497, Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
4. A615, Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
5. A706, Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
6. A775, Specification for Epoxy-Coated Reinforcing Steel Bars.

B. American Concrete Institute (ACI).

1. ACI 350, Code Requirements for Environmental Engineering Concrete Structures

1.03 SUBMITTALS

- ###### A. In accordance with Section 01300 submit cutting and bending drawings and schedules for all reinforcement to be furnished.

B. Shop Drawings:

1. Prepare in accordance with Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice and ACI SP-66 Detailing Manual:
 - a. Bending lists.
 - b. Placing drawings.
2. Welded splice, Cadweld splice, and mechanical threaded splice.

C. Quality Control Submittals:

1. Lab test reports for reinforcing steel showing stress-strain curves and ultimate strengths.
2. Mechanical Threaded Connections:
 - a. Current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
 - b. Manufacturer's instructions.
 - c. Verification that device threads have been checked and meet all requirements for thread quality, in accordance with manufacturer's published methods.
3. Epoxy-Coated Reinforcing Bars: Written certification in accordance with paragraph 4.2.1 of ASTM A775.
4. Welding Qualification: Prior to welding, submit welder qualifications and radiographic nondestructive testing procedures.
 - . Test results to field testing.

1.04 QUALITY ASSURANCE

- A. The steel shall be newly rolled stock substantially free from mill scale, rust, dirt, oil, grease, or other foreign matter. Bars shall be of billet steel and, unless otherwise indicated, shall be Grade 60 bars.
- B. Billet steel bars shall conform to ASTM A 615.
- C. All bars shall be rolled by an acceptable mill. The Contractor shall submit at his own expense certified copies of tests of the bars furnished. The tests shall be as specified in the appropriate ASTM Specification referred to above and shall be made by an acceptable laboratory.
- D. Welder Qualifications: Certified in accordance with AWS D1.4-79.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."
- B. Coated Bars:
 1. Protect epoxy-coated bars contact areas from handling equipment.
 2. Lift bundles of coated bars at multiple pickup points to minimize bar-to-bar abrasion from sags in bundles.
 3. Do not drop or drag coated bars or bundles of coated bars.
 4. Store coated bars on protective cribbing.
 5. Color fading of coating is not cause for rejection of epoxy-coated reinforcing bars.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Deformed Billet-Steel Reinforcing Bars:
 - 1. Includes stirrups, ties, and spirals.
 - 2. ASTM A615, Grade 60, including Supplemental Requirements S1 where welding is not required.
 - 3. ASTM A706, Grade 60, including Supplemental Requirements for reinforcing to be welded.

- B. Splices and Mechanical Connections:
 - 1. Metal Sleeve: Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of the bar.
 - 2. Mechanical Threaded Connections: Furnish metal coupling sleeve for splicing reinforcing in secondary members or in areas of low stress with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
 - a. Manufacturers and Products:
 - 1) Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
 - 2) Richmond Screw Anchor Co., Inc. Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.
 - 3) Or equal.

- C. Epoxy-Coated Reinforcing Bars: ASTM A775, deformed bars, with bond strength not less than 80 percent of uncoated bars.

- D. Welded Wire Fabric:
 - 1. ASTM A185, or A497, and ACI 318/318R, using ASTM A82, wire of 75 ksi minimum tensile strength.
 - 2. Furnish flat sheets only, rolled sheets not permitted.

- E. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than two times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness except for bars larger than 1 in., in which case the bends shall be made around a pin of eight bar diameters. All bars shall be bent cold.

- F. Bars shall be shipped to the work site with bars of the same size and shape fastened in bundles with securely wired-on metal identification tags giving size and mark.

- G. Deformations on bars for concrete reinforcement shall conform to the requirements of the above-mentioned ASTM Specifications.

2.02 ACCESSORY MATERIALS

- A. Tie Wire:
 - 1. Black, soft-annealed 16-gauge wire.
 - 2. Nylon-, epoxy-, or plastic-coated wire.
- B. Bar Supports and Spacers:
 - 1. Precast concrete bar supports, cementitious fiber-reinforced bar supports, or all-plastic bar supports and side form spacers meeting the requirements of CRSI Manual of Standard Practice. Do not use other types of supports or spacers.
 - 2. In Beams, Columns, Walls, and Slabs Exposed to View After Stripping: Small rectangular concrete blocks made up of same color and strength as concrete being placed around them or all-plastic bar supports and side form spacers.
 - 3. Use supports made of dielectric material for epoxy-coated reinforcing bars supported from formwork.
 - 4. If epoxy-coated reinforcing is used, furnish epoxy-coated reinforcing bars for spreader bars.
 - 5. Precast concrete supports of same strength as concrete for reinforcing in concrete placed on grade.
- C. Welded steel wire fabric shall conform to the ASTM A 185. The gage and spacing of wires shall be as indicated on the drawings.
- D. Soffit Clips: Made galvanized steel wire not lighter than No. 12 Stl. W.C. They shall be shared so that the greater portion of the wire is held about 1 in. from the flange of the steel beam, and shall be spaced not less than 9 in. on centers, the spacing being maintained by suitable longitudinal wires.

2.03 FABRICATION

- A. Follow CRSI Manual of Standard Practice.
- B. Bend all bars cold.

PART 3 EXECUTION

3.01 PREPARATION

- A. Notify ENGINEER when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.
- B. Repair epoxy coating damaged due to handling, shipment, and placing. Repair with patching material in accordance with ASTM A775, and manufacturer's recommendations.
- C. Clean metal reinforcement of loose mill scale, oil, earth, and other contaminants.

- D. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.
- E. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings, including ice, that tend to interfere with development of proper bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.
- F. Reinforcement which is to be exposed for a considerable length of time after having been placed shall be painted with a heavy coat of cement grout, if required.

3.02 Reinforcing Bar Installation

- A. Bundle or space bars, instead of bending where construction access through reinforcing is necessary.
- B. Spacing and Positioning: Conform to ACI 350.
- C. Location Tolerances: In accordance with CRSI publication, "Placing Reinforcing Bars".
- D. Splicing:
 - 1. Follow ACI 318/318R.
 - 2. Use lap splices unless otherwise shown or permitted in writing by ENGINEER.
 - 3. Welded Splices: Accomplish by full penetration groove welds and develop at least 125 percent of yield strength of bar.
 - 4. Stagger splices in adjacent bars.
 - 5. Metal sleeves may be used.
- E. Mechanical Splices and Connections:
 - 1. Use only in areas specifically approved in writing by the ENGINEER.
 - 2. Install as required by manufacturer with threads tightened and in accordance with ICBO Research Report.
 - 3. Maintain minimum edge distance and concrete cover.
- F. Tying Deformed Reinforcing Bars:
 - 1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
 - 2. Bend all noncoated tie wire to prevent tie wire from being closer than 1 inch from the surface of concrete.
 - 3. Epoxy-Coated Bars:
 - a. Use epoxy-coated or nonmetallic clips.
 - b. Repair coating damage at clipped or welded intersection.
- G. Reinforcement Around Openings: Place an equivalent area of steel bars or fabric around pipe or opening and extend as shown, on each side sufficiently to develop bond with each bar. See drawing details.

H. Welding Reinforcement:

1. Only A706/A706M bars may be welded.
2. Do not perform welding until welder qualifications are approved.
3. Provide suitable ventilation when welding epoxy-coated reinforcing bars.
4. After completion of welding on epoxy-coated reinforcing bars, repair coating damage, welds, and steel splice members with same material as used for repair of coating damage.

I. Straightening and Rebending: Field bending of reinforcing steel bars is not permitted.

J. Unless permitted by Engineer, do not cut reinforcing bars in the field. When epoxy-coated reinforcing bars are cut in the field, coat ends of bars with same material used for repair of coating damage.

K. Reinforcement shall be accurately positioned as indicated on the drawings, and secured against displacement by using annealed iron wire ties or suitable clips at intersections. Concrete blocks having a minimum bearing area of 2 in. by 2 in., and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Where the underside of slabs will be exposed to view in the finished work, stainless-steel supports shall be used

L. Furnish and place all concrete reinforcement as indicated on the drawings and as herein specified. Concrete reinforcement in sizes No. 3 (3/8 in.) and larger shall be deformed steel bars of the shapes and sizes indicated on the drawings.

3.03 WELDED WIRE FABRIC INSTALLATION

A. Extend fabric to within 2 inches of edges of slab, and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.

B. Tie laps and splices securely at ends and at least every 24 inches with tie wire.

C. Place welded wire fabric on concrete blocks at correct distance as shown, above bottom of slab and rigidly support equal to that provide for reinforced bars. Do not use broken concrete, brick, or stone.

D. Follow ACI 350 and current Manual of Standard Practice, Welded Wire Fabric.

E. Do not use fabric that has been rolled. Install flat sheets only.

3.04 TESTS AND INSPECTION

A. Test 10 percent of all welds using radiographic, nondestructive testing procedures referenced in AWS D1.4-79.

- B. Inspect each splice and verify each component is in accordance with manufacturer's instructions and ICBO Research Report.

END OF SECTION

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SECTION 03250

EXPANSION, CONSTRUCTION, AND CONTROL JOINTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for making joints in concrete and masonry.

B. Related Sections

1. Section 03200 - Concrete Reinforcing
2. Section 03300 - Cast-In-Place Concrete
3. Section 03604 – Non Shrink Grout
4. Section 07920 - Joint Sealants

1.02 REFERENCES

A. Army Corp. of Engineers.

1. CRD-C-572, Specification for Polyvinyl chloride Waterstop.

B. American Society for Testing and Materials (ASTM)

1. A36, Specification for Carbon Structural Steel.
2. D226, Specification for Asphalt-Saturated Organic Felt used in Roofing and Waterproofing.
3. D227, Specification for Smooth-Surfaced Asphalt Roll Roofing and Waterproofing.
4. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
5. D1506, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
6. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

C. National Sanitation Foundation (NSF).

1. 61-90,

1.03 SUBMITTALS

A. Shop Drawings:

1. Plastic Type Water Stops: Details of splices to be used and method of securing water stop in the forms and supporting water stop so as to maintain proper orientation and location during concrete placement.
2. Construction Joints: Layout and location indicating type to be used.
3. Joint fillers for horizontal and sloped joints.
4. Preformed control joints.
5. Water stop.

- B. Samples: Splice, joint, and fabricated cross of each size, shape, and fitting of water stop(s) proposed for use.
- C. Quality Control Submittals:
 - 1. Water stop manufacturer's written instructions for product shipment, storage, handling, installation field splices, and repair.
 - 2. Joint filler and primer. Manufacturer's written instructions for product shipment, storage, handling, application and repair.
 - 3. Preformed Control Joint: Manufacturer's written instructions for product shipment, storage, handling, application, and repair.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Acceptance of pourable joint filler for potable water structures by federal EPA or by a state health agency.
 - 1. Pourable Joint Filler: Certified as meeting NSF 61-90.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site: Verify that water stops delivered are in accordance with cross-section dimensions as shown and manufacturer's product data prior to unloading and storing on site.

PART 2 PRODUCTS

2.01 PLASTIC WATER STOP

- A. Extruded from an elastomeric plastic compound of which the basic resin shall be polyvinyl chloride (PVC). Reclaimed PVC in the compound is not acceptable.
- B. Specific Gravity: Approximately 1.37.
- C. Shore Durometer Type A Hardness: Approximately 80.
- D. Performance Requirements: Corps of Engineers' Specification CRD-C-572.
- E. Type: Center bulb with a number of parallel ribs or protrusions on each side of strip center.
- F. Corrugated or tapered type water stops are not acceptable.
- G. Thickness: Constant from bulb edge to the outside stop edge.
- H. Minimum Weight per Foot of Water Stop:

1. 0.90 pound for 3/16 inch by 4 inch.
2. 1.62 pounds for 3/8 inch by 6 inch.
3. 2.30 pounds for 3/8 inch by 9 inch.

I. Manufacturers and Catalog Numbers:

1. Vulcan Metal Products, Inc., Construction Materials Division, Birmingham, AL; Catalog No. 3/81-15M: Type 8067 (4 inch by 3/16 inch), Type 8069 (6 inch by 3/8 inch), and Type 8070 (9 inch by 3/8 inch).
2. Vinylex Corp., Knoxville, TN; Catalog No. 03250/VIN (1987): No. RB6-38H (6 inch by 3/8 inch) and No. RB9-38H (9 inch by 3/8 inch).
3. Greenstreak Plastic Products, St. Louis, MO; Catalog No. 03250/GRD (1987): Style 732 (6 inch by 3/8 inch) and Style 735 (9 inch by 3/8 inch).
4. A.C. Horn, Inc., Beltsville, MD; Catalog No. CSP-162 (1987): Type 3 (4 inch by 3/16 inch), Type 9 (6 inch by 3/8 inch), and Type 10 (3/8 inch by 9 inch).

2.02 WIRE LOOPED PLASTIC WATER STOP

- A. Furnish as an alternative to plastic water stops.
- B. Same material and geometry as plastic water stops.
- C. Furnish with continuous galvanized wire looping at edge for convenience in positioning and securing stop in place in the forms.
- D. Manufacturers and Catalog Numbers:
 1. Paul Murphy Plastics, Roseville, MI; "Wire Stop Water Stop"; geometry numbers ACR 6380, ACR 9380, as shown on Paul Murphy Plastics Co. Drawing No. CCP-120-12M dated 12-89.
 2. Or equal.

2.03 BOND BREAKER

- A. Tape for Expansion Joints: Adhesive-backed glazed butyl or polyethylene tape, same width as the joint, that will adhere to the premolded joint material or concrete surface.
- B. Use either bond breaker tape or a bond prevention material as specified in SECTION 03300, except where a tape is specifically called for.

2.04 PREMOLDED JOINT FILLER

- A. Bituminous Type: ASTM D994 or D1751.
- B. Sponge Rubber: Neoprene, closed-cell, expanded; ASTM D1056-85, Type 2C5, with a compression deflection, 25 percent deflection (limits), 119 to 168 kPa (17 to 24 psi) minimum.
 1. Manufacturer and Product:
 - a. Rubatex Corp.; R451N
 - b. Or equal.

2.05 PREFORMED CONTROL JOINT

A. One-Piece, Flexible, Polyvinyl Chloride Joint Former:

1. Manufacturer and Product:
 - a. Vinylex Corp., Knoxville, TN; Kold-Seal Zip-Per Strip KSF-150-50-50.
 - b. Or equal.

B. One-Piece Steel Strip with Preformed Groove:

1. Manufacturer and Product:
 - a. Burke Concrete Accessories, Inc., San Mateo, CA; Keyed Kold Retained Kap.
 - b. Or equal.

C. Furnish in full-length, unspliced pieces.

2.06 POURABLE JOINT FILLERS

A. Filler for Nonpotable Water Structure:

1. Specific Gravity: Greater than 1.0 for cured, in-place filler.
2. Sloped Joints: Furnish Gun Grade material that will remain as placed in joints and will not run down slope.
3. Manufacturers and Products:
 - a. W.R. Meadows, Inc., Elgin, IL: No. 164 Polymeric sealing compound, hot-pour, or Hi-Spec Polymeric joint sealing, hot-pour compound; or
 - b. A.C. Horn, Inc., North Bergen, NJ: No-Track two-component material (Code 2323), cold-applied, self-leveling filler; or
 - c. W.R. Meadows, Elgin, IL: Gardox, two-component, cold-applied compound filler.

2.07 STEEL EXPANSION JOINT DOWELS

A. Dowels: ASTM A36 round smooth steel bars.

B. Bar Coating: Two-coat system, fusion bonded, steel dowel coating, with a factory-applied lubricating coating.

2.08 ACCESSORIES

A. Joint Sealants: As specified in SECTION 07920, JOINT SEALANTS.

B. Nonshrink Grout:

1. As specified in SECTION 03604.
2. Compatible with joint sealant.

C. Roofing Felt: ASTM D226, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227 coal-tar saturated felt.

D. Reinforcing Steel: As specified in SECTION 03200.

- E. Nails: As required for securing bituminous type premolded joint filler.
- F. Masking Tape: As required to temporarily adhere to concrete at each side of joint to receive filler.

PART 3 EXECUTION

3.01 GENERAL

- A. Construct straight joints; make vertical or horizontal, except where walls intersect sloping floors.
- B. Commence concrete placement after the joint preparation is complete.
- C. Time Between Concrete Pours: As specified in SECTION 03300.

3.02 SURFACE PREPARATION

- A. Construction Joints: Prior to placement of abutting concrete, clean contact surface:
 - 1. Remove laitance and spillage from reinforcing steel and dowels.
 - 2. Roughen surface to a minimum of 1/4-inch amplitude:
 - a. Sandblast after the concrete has fully cured.
 - b. Water blast after the concrete has partially cured.
 - c. Green cut fresh concrete with high pressure water and hand tools.
 - 3. Perform cleaning so as not to damage water stop, if one is present.
- B. Expansion Joint with Pourable Filler:
 - 1. Use motorized wire brush or other motorized device to mechanically roughen and thoroughly clean concrete surfaces on each side of joint from plastic water stop to the top of the joint.
 - 2. Use clean and dry high pressure air to remove dust and foreign material, and dry joint.
 - 3. Prime surfaces before placing joint filler.
 - 4. Avoid damage to water stop.
- C. Expansion Joint without Pourable Filler:
 - 1. Coat concrete surfaces above and below plastic water stop with bond breaker.
 - 2. Do not damage water stop.
- D. Control Joint:
 - 1. Coat concrete surfaces above and below plastic water stop with bond breaker.
 - 2. Do not damage water stop.
 - 3. Furnish correct type and size of reinforcing and dowels.

3.03 INSTALLATION OF WATER STOPS

- A. General:

1. Join water stops at intersections to provide continuous seal.
 2. Center water stop on joint.
 3. Secure water stop in correct position to avoid displacement during concrete placement.
 4. Repair or replace damaged water stop.
 5. Place concrete and vibrate to obtain impervious concrete in the vicinity of all joints.
 6. Joints in Footings and Slabs:
 - a. Ensure that space beneath plastic water stop is completely filled with concrete.
 - b. During concrete placement, make a visual inspection of the entire water stop area.
 - c. Limit concrete placement to elevation of water stop in first pass, vibrate the concrete under the water stop, lift the water stop to confirm full consolidation without voids, then place remaining concrete to full height of slab.
 - d. Apply procedure to full length of plastic water stops.
- B. Plastic Water Stop:
1. Install in accordance with manufacturer's written instructions.
 2. Splice in accordance with the water stop manufacturer's written instructions using a thermostatically controlled heating iron. Butt splice unless specifically detailed otherwise.
 - a. Allow at least 10 minutes before the new splice is pulled or strained in any way.
 - b. Finished splices shall provide a cross-section that is dense and free of porosity with tensile strength of not less than 80 percent of the unspliced materials.
 3. Wire looped plastic water stop may be substituted for plastic water stop.

3.04 EXPANSION JOINT INSTALLATION

A. General:

1. Place bond breaker above and below water stop when premolded joint filler and pourable joint filler is not used.
2. Premolded Joint Filler:
 - a. Sufficient in width to completely fill the joint space where shown.
 - b. If a water stop is in the joint, cut premolded joint filler to butt tightly against the water stop and the side forms.
3. Precut premolded joint filler to the required depth at locations where joint filler or sealant is to be applied.
4. Form cavities for joint filler with either precut, premolded joint filler, or smooth removable accurately shaped material. Entire joint above water stop, in slabs, shall be formed and removed so that entire space down to water stop can be filled with the pourable joint filler.
5. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface.

B. Bituminous Type Premolded Joint Filler:

1. Drive nails approximately 1 foot 6 inches on center through the filler, prior to installing, to provide anchorage embedment into the concrete during concrete placement.
2. Secure premolded joint filler in forms before concrete is placed.
3. Install in walkways, at changes in direction, at intersections, at each side of driveway entrances, and at 45-foot intervals, maximum.

C. Pourable Joint Filler:

1. General: Install in accordance with the manufacturer's written instructions, except as specified below:
 - a. Apply primer prior to pouring joint filler.
 - b. Fill entire joint above the water stop with joint filler as shown.
 - c. Use masking tape on top of slabs at sides of joints; clean spillage. Remove masking tape afterwards.
2. Rubber Asphalt Type, Hot-Applied:
 - a. Heat filler material in a double-walled boiler.
 - b. Place filler in the joint by means of a nozzle from a portable pouring type container to prevent spillage outside of the joint.
 - c. Begin pouring joint filler at the bottom of the horizontal joint and proceed upwards in a manner that will preclude the possibility of trapping air in the joint.
3. Rubber Asphalt Type, Cold-Applied: Place cold-applied two-component fillers in accordance with manufacturer's written instructions.
4. Multicomponent Type for Potable Water Structures: Install in accordance with manufacturer's written instructions.

D. Steel Expansion Joint Dowels:

1. Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to the joint in both plan and section view, so as to permit joint to expand or contract without bending the dowels.
2. Secure dowels tightly in forms with rigid ties.
3. Install reinforcing steel in the concrete as shown to protect the concrete on each side of the dowels and to resist any forces created by joint movement.

3.05 CONTROL JOINT INSTALLATION

- A. Locate reinforcing and dowels as shown.
- B. Install PVC water stop.
- C. Concrete surfaces shall be dense and smooth.
- D. Install bond breaker to concrete surfaces above and below water stop.

3.06 PREFORMED CONTROL JOINTS

- A. Use only where specifically shown; do not use in water-holding basins.

- B. Locate flush, or slightly below the top of slab.
- C. Install in accordance with manufacturer's written instructions in straight, full-length unspliced pieces.
- D. Steel Strip Type with Preformed Groove: Brace to withstand pressure of concrete during and after placement.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for furnishing and installing forms, reinforcing steel, concrete and expansion and/or construction joints.
- B. Related Section
 - 1. Section 03100 – Formwork
 - 2. Section 03200 – Reinforcement
 - 3. Section 03250 – Expansion, Construction, And Control Joints

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - 2. A615, Specification for deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. C31, Practice for Making and Curing Concrete Test Cylinders in the Field.
 - 4. C33, Specification for Concrete Aggregates.
 - 5. C39, Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 6. C42, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - 7. C94, Specification for ready Mixed Concrete.
 - 8. C143, Test Method for Slump of Hydraulic Cement Concrete.
 - 9. C150, Specification for Portland Cement.
 - 10. C172, Practice for Sampling Freshly Mixed Concrete.
 - 11. C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - 12. C260, Test Method for Air-Entraining Admixtures for Concrete.
 - 13. C494, Specification for Chemical Admixtures for Concrete.
 - 14. C920, Specification for Elastomeric Joint sealants.
 - 15. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
 - 16. D1056, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

17. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

B. American Concrete Institute (ACI):

1. ACI 301, Specification for Structural Concrete for Buildings.
2. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
3. ACI 305, Recommended Practice for Hot Weather Concreting.
4. ACI 306, Recommended Practice for Cold Weather Concreting.
5. ACI 315, Building Code Requirements for Reinforced Concrete.
6. ACI 347, Guide to Formwork for Concrete.

C. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Standard Practice.

1.03 SUBMITTALS

A. Submit Shop Drawings in accordance with SECTION 01300 for the following:

1. Reinforcing Steel
 - a. Furnish in detail and completeness that all fabrication and placement at the site can be accomplished without the use of contract drawings for reference.
 - b. Include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
 - c. Show joint layout and design
 - d. Check structural and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
2. Concrete mix designs.
3. Grout manufacturer/design mix (if included in this section)
4. Manufacturer's data for ancillary materials such as joint fillers and sealants, epoxy bonding compound.

1.04 QUALITY ASSURANCE

A. Selection of testing laboratory in accordance with SECTION 01410.

B. Sample and Test Concrete as follows:

1. Test Specimens: Make, cure and have tested, a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM C172, C31 and C39. One cylinder shall be broken after seven days and three cylinders after twenty-eight day.
2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.

3. Air Content: An air content test shall be made from each day's pour of concrete by the pressure method in accordance with ASTM C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.
4. In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Engineer may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to the Owner. Any other work damaged as a result of this concrete removal shall be replaced with new materials to the satisfaction of the Engineer at no additional cost to the Owner. The cost of coring will be deducted from the contract amount. Where the Testing Laboratory has taken core cylinders and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Engineer at no additional cost to the Owner.
5. The Contractor shall coordinate the date and location of tests with the Engineer before any concrete work is started.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Reinforcing steel.

1. Transport to the site, store, and cover in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete, or chip protective epoxy coating if applicable.
2. Store on the site at all times, a supply of approved reinforcing steel to ensure that there will be no delay of the work.
3. Identification of steel shall be maintained after bundles are broken.

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland Cement.

1. Portland Cement used for building footings, base slabs, foundation walls, columns, and beams shall be in accordance with ASTM C150, Type V of U.S. manufacture.
2. All other Portland Cement shall be in accordance with ASTM C150, Type II of U.S. manufacture.

B. Aggregates.

1. Fine aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to fines.
2. Coarse aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to maximum sizes hereinafter specified.

C. Air Entraining Agent.

1. In accordance with ASTM C260.

- D. Water Reducing Agent.
 - 1. In accordance with ASTM C494 Type A.
- E. Microsilica Admixture.
 - 1. Packaged in easily dispersing form.
- F. Water.
 - 1. Clean and potable,
 - 2. Free of impurities detrimental to concrete.
- G. Reinforcing Bars.
 - 1. See Section 3200.
- H. Welded Wire Fabric
 - 1. See Section 3200.
- I. Accessories.
 - 1. See Section 3200.
- J. Tie wire.
 - 1. See Section 3200.
- K. Form Ties and Spreaders.
 - 1. See Section 3100.
- L. Form Coatings.
 - 1. Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface.
 - 2. "Nox-Crete Form Coating" as manufactured by Nox-Crete Company, or approved equal.
 - 3. Coatings containing mineral oils or the non-drying ingredients will not be permitted.
- M. Grout.
 - 1. See Section 3604.

2.02 CONCRETE STRENGTHS AND PROPORTIONS

- A. Cast-in-place concrete shall have the minimum compressive strength at 28 days as indicated on the Drawings.
- B. The exact proportions for the mix, including amounts admixture (if any), and water, shall be determined by the concrete supplier.
- C. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement, but without permitting the materials to segregate or excess free water to collect on the surface.

D. Air-Entrainment: The air content in all concrete shall be maintained at 5 to 7 percent.

2.03 PREMOLDED JOINT FILLER

1. See Section 3250.

2.04 POURABLE JOINT FILLERS

1. See Section 3250.

2.05 JOINT SEALANTS

A. In slabs.

1. In accordance with ASTM C920 for poured 2-component polyurethane sealant.
2. Sikaflex-2c, as manufactured by Sika Corporation or approved equivalent.

B. In walls.

1. Type II, Class A, compound conforming to Interim Federal Specification TT-S-00227E (3) (COM-NBS) for Sealing Compound; Elastomeric Type, Multi-Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures).
2. Sikaflex-1a, as manufactured by Sika Corporation or approved equivalent.

2.06 EPOXY BONDING COMPOUND

- A. The epoxy bonding compound shall be a three-component, solvent-free, moisture-tolerant, epoxy modified, cementitious product specifically formulated as a bonding agent and anti-corrosion coating. The product shall have suitable contact time, fluidity, and application temperature for this type of application.

2.07 WATERSTOPS

- A. PVC Waterstops shall be in accordance with Section 03250 – Expansion, Construction, and Control Joints.

PART 3 EXECUTION

3.01 FORMWORK

1. See Section 3100.

3.02 REINFORCING STEEL

1. See Section 3200.

3.03 CONCRETE

A. Mixing of Concrete

1. All concrete shall be ready-mixed concrete, and shall be mixed and delivered in accordance with ASTM C 94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.

2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.
 3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.
 4. No admixtures, except those mentioned in paragraph 2.1 shall be used. Calcium chloride will not be permitted.
 5. Truck delivery slips of all concrete delivered to the job shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. Delivery slips shall be forwarded to the Engineer at the end of each pour.
- B. Cold Weather Concreting.
1. In accordance with ACI 306.
 2. Concrete shall not be mixed or placed when the temperature is below 40 degrees F, or when conditions indicate that the temperature will fall below 40 degrees F within 72 hours unless precautions are taken to protect the concrete.
 3. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.
 4. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.
 5. Calcium chloride shall not be used.
- C. Hot Weather Concreting.
1. In accordance with ACI 305.
 2. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by methods approved by the Engineer.
 3. No concrete shall be deposited when the air temperature is greater than 90 degrees F.
- D. Conveying and Placing Concrete.
1. In accordance with ACI 304.
 2. Notification: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.

3. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains into a sump, or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.
4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).
5. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.

E. Handling and Depositing

1. Before any concrete is placed, notify all whose work is in any way connected with or influenced by the concrete work, and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.
2. Immediately before concrete is placed, inspect all forms to insure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials, and that all reinforcement is in proper position.
3. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.
4. Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods that prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid rehandling or flowing.
5. Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
6. Concrete that has partially hardened shall not be deposited in the work.

F. Pumping

1. Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed.
2. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.
3. The concrete mix shall be designed to the same requirements as herein before specified, and may be richer in lubricating components in order to allow proper pumping.
4. Concrete shall not be pumped through aluminum pipes.

G. Vibrating and Compacting

1. All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under

experienced supervision, and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.

2. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than seven thousand (7,000) impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.
3. Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Care shall be taken to not disturb concrete that has its initial set.
4. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least one inch.
5. The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.

H. Construction Joints

1. Construction joints shall be located a maximum of 40 feet apart. If, for any reason, the contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Engineer for approval.
2. Where a joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a coat of grout immediately before the placing of new concrete.
3. Approved keys shall be used at all joints, unless detailed otherwise.
4. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.

I. Bonding Concrete at Construction Joints

1. To new concrete construction joints:
 - a. Thoroughly clean and saturate joint with water.
 - b. Cover horizontal wall surfaces as specified in this Section, and immediately place concrete.
 - c. Limit concrete lift placed immediately on top of bonding compound to 12 inches thick.
 - d. Thoroughly vibrate to mix and consolidate bonding compound and concrete together.

J. Bonding new concrete to old concrete:

1. Mechanically roughen existing concrete surfaces to a clean, rough surface using appropriate mechanical means to remove the existing concrete surface, and provide a minimum roughness profile of 1/4-inch.
 2. Saturate surface with water for 24 hours, cover with epoxy bonding compound and place concrete as specified for new concrete.
- K. Expansion Joints
1. Expansion joints shall be located as shown on contract drawings.
 2. The joint shall include a joint filler, a bond breaker and joint sealant and installed as indicated on contract drawings.
- L. Joint Sealants.
1. See Section 7920.
- M. Patching
1. Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry.
 2. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Engineer's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solids with matching concrete to produce firm bond and surface.
 3. The Contractor shall do all the cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted, or shall any structural members or reinforcement be cut.
 4. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 mix.
- N. Protection and Curing
1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
 2. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least (7) days.
 3. Carefully protect exposed concrete corners from damage.
 4. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be curing with Burlene or fog spray or an approved curing compound.
 5. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.
- O. Finishing Formed Surfaces
1. General: Addition of Material: The addition of cement, sand, water or mortar to slab surfaces while finishing concrete is strictly prohibited.

2. Rough-Formed Finish: This finish has an as-cast texture imparted by the form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding the limits specified by ACI 117 for the class of surface specified.
 - a. All surfaces that will be permanently concealed below grade shall have a Rough-Formed Finish.
3. Smooth-Formed Finish: This finish has an as-cast texture imparted by the form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove all fins and other projections.
 - a. Apply a Smooth-Formed Finish to all surfaces to be covered with a coating or covering material applied directly to the concrete such as waterproofing, dampproofing, veneer plaster or painting.
 - b. Apply to the interior surfaces of tanks holding process water.
 - c. Apply to baffle walls in the wet well.
 - d. Do not apply rubbed finish to smooth-formed finish.
4. Rubbed Finish:
 - a. Smooth-Rubbed Finish: Not later than one day after form removal, moisten the concrete surfaces and rub with a silicon-carbide brick to produce a uniform color and texture. Do not apply cement grout other than that created by the rubbing process. Apply to the surfaces that will be permanently exposed to view.
 - b. Grout-Cleaned Finish: Wet the concrete surfaces and apply a grout of a consistency of thick paint to coat the surfaces and small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. When the grout whitens, rub the surface with clean burlap and keep the surface damp with a fog spray for at least 36 hours. Apply Grout-Cleaned Finish to the surfaces of all channels that will carry flowing process water. This requirement is applicable to the concrete surfaces of the wet well.
5. Related Unformed Surfaces:
 - a. At tops of walls, horizontal offsets and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise specified.
6. Finishing Floors and Slabs
 - a. General: Addition of Material: The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.
 - b. Comply with the recommendations of ACI 302.1R for screeding, restraightening and finishing operations for concrete surfaces.
 - c. Float Finish:
 - 1) Consolidate the surface with power-driven floats or by hand floating if the area is small or inaccessible to power-driven floats. Restraighten, cut down high spots and fill in low spots. Repeat float passes and

restraightening until the surface is left with a uniform, smooth granular texture.

2) Apply float finish surfaces to receive a trowel finish.

d. Trowel Finish:

1) After applying float finish, apply first trowel finish and consolidate concrete by hand or power driven trowel. Continue troweling passes and restraighten until the surface is free of trowel marks and is uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

2) Apply a trowel finish to interior floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet or ceramic tile and the wet well trench floor.

3) Finish surfaces to the following tolerances measured within 24 hours of troweling according to ASTM E 1155 for a randomly trafficked floor surface.

4) Specified overall values of flatness, FF 25; and levelness, FL 20; with minimum local values of flatness, FF 17; and levelness, FL 15.

e. Broom Finish

1) Immediately after float finishing, slightly roughen trafficked surface by brooming with a fiber-bristle broom. Broom transverse to traffic or at right angles to the slope of the slab. Permit surface to harden sufficiently to retain the scoring or ridges.

2) Apply a broom finish to all exterior concrete pads, walkways and slabs on grade.

P. Defective Work

1. The following concrete work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense:

a. Incorrectly formed.

b. Not plumb or level.

c. Not specified strength.

d. Containing rock pockets, voids, honeycomb, or cold joints.

e. Containing wood or foreign matter.

f. Otherwise not in accordance with the intent of the Drawings and Specifications.

END OF SECTION

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SECTION 03320

CONCRETE SEALANT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to seal all exposed concrete shown on the drawings or specified herein.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM).
 - 1. C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

1.03 SUBMITTALS

- A. In accordance with Section 01300.
- B. Shop Drawings:
 - 1. Curing methods proposed.
 - 2. Manufacturer's data for the following products:
 - a. Exposed aggregate finish retardant on formed surface.
 - b. Evaporation retardant.
 - c. Curing compound.
 - d. Clear sealer.
 - e. Clear floor hardener.
- C. Quality Control Submittals:
 - 1. Curing Compound: Manufacturer's Certificate of Compliance showing moisture retention requirements.
 - 2. Retardants for Exposed Aggregate Finish: Manufacturer's Certification of Compliance.

PART 2 PRODUCTS

2.10 MATERIALS

- A. Curing Compound:
 - 1. Solvent-based, high chlorinated rubber solids content curing compound meeting requirements of ASTM C309.
 - a. Moisture Loss: 0.030 gm/square cm/72 hours maximum.
 - b. Capable of meeting moisture retention with one coat.
 - 2. Manufacturers and Products:

- a. Master Builders Co., Cleveland, OH; Masterkure CR.
 - b. Euclid Chemical Co., Cleveland, OH; Euco Super Floor Coat.
 - c. Or equal.
- B. Evaporation Retardant:
- 1. Optional: Fluorescent color tint that disappears completely upon drying.
 - 2. Manufacturers and Products:
 - a. Master Builders Co., Cleveland, OH; CONFILM.
 - b. Euclid Chemical Co., Cleveland, OH; Eucoar.
 - c. Or equal.
- C. Clear Sealer (One-Component Penetrating Silane Siloxane Sealer):
- 1. Manufacturers and Products:
 - a. Master Builders, Inc.; MASTERSEAL SL.
 - b. Euclid Chemical Co.; Eucoguard 200.
 - c. Or equal.
- D. Clear Floor Hardener:
- 1. Colorless, aqueous premixed solution of zinc and magnesium fluosilicate.
 - 2. Each gallon of fluosilicate solution shall contain minimum 2 pounds of crystals.
- E. Water: Clean and potable, containing less than 50 ppm of chlorides.

PART 3 EXECUTION

3.10 CURING OF CONCRETE

- A. Use one of the following methods as approved by ENGINEER:
- 1. Walls:
 - a. General: Where walls are to receive coatings, painting, cementitious material, or other similar finishes, or where solvent-based coatings are not permitted, use only water curing procedures.
 - b. Method 1: Leave concrete forms in place and keep entire surfaces of forms and concrete wet for 7 days.
 - c. Method 2: Apply curing compound, where allowed, immediately after removal of forms.
 - d. Method 3: Continuously sprinkle with water 100 percent of exposed surfaces for 7 days starting immediately after removal of forms.
 - 2. Slabs and Curbs:
 - a. Method 1: Protect surface by water ponding for 7 days.
 - b. Method 2: Cover with burlap or cotton mats and keep continuously wet for 7 days.
 - c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 7 days.
 - d. Method 4: Continuously sprinkle exposed surface for 7 days.

- e. Other agreed upon method that will keep moisture present and uniform at all times on surface of slabs. Do not use curing compounds.
 - f. Where water curing for slabs during cold weather is not possible, use an ENGINEER-approved curing compound at manufacturer's recommended coverage per gallon.
 - g. Where curing compound cannot be used, special methods using moisture shall be agreed upon prior to placing the concrete slabs.
 - h. Protect slabs during cold weather with plastic sheets or other materials inside required heated enclosure if foot traffic is permitted on slabs.
- B. Use only water curing on potable water structures.
- C. Use only water curing methods where solvents in the curing compounds are prohibited by state or federal air quality laws.
- D. Use only water curing where additional finishes such as clear sealer, hardeners, painting, and other special coatings are required.

3.20 EVAPORATION RETARDANT APPLICATION

- A. Spray onto surface of fresh flat work concrete immediately after screening to react with surface moisture.
- B. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

3.30 CLEAR SEALER APPLICATION

- A. Apply where indicated in Finish Schedule.
- B. Before application, water cure concrete walls and floors to receive sealer for a minimum of 28 days, keep clean, unpainted, free from membrane curing compounds, with Work above them completed.
- C. Apply with stiff brush, short nap roller, squeegee, garden sprayer, or conventional paint spray equipment.
- D. Apply at a coverage rate of 125 to 200 square feet per gallon and cure the sealer on slabs for the following minimum cure time at the ambient temperatures shown prior to allowing foot traffic:
 - 1. 90 degrees F - 2 hours.
 - 2. 75 degrees F - 4 hours.
 - 3. 50 degrees F - 8 hours.
 - 4. 35 degrees F - 16 hours.

3.40 CLEAR HARDENER APPLICATION

- A. Before application, water cure floors to receive hardener for minimum 28 days, keep clean, unpainted, free to membrane curing compounds, and perfectly dry with all work above them completed.
- B. Apply hardener evenly, using three coats, allowing 24 hours between coats.
 - 1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water.
 - 2. Apply each coat so as to remain wet on surfaces for 15 minutes.
 - 3. Apply approved hardeners in accordance with manufacturer's instructions.
 - 4. After final coat is completed and dry, remove surplus hardener from surface by scrubbing and mopping with water.

3.50 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at site for installation assistance, inspection, and certification of proper installation for products specified.
- B. Provide clear sealer manufacturer's representative to demonstrate proper application of product.
- C. Provide floor hardener manufacturer's representative to demonstrate proper mixing and application of product.
- D. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound to show coverage in one coat.

END OF SECTION

SECTION 03604

NON-SHRINK CONSTRUCTION GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies furnishing and installing non-shrink grout for interior and exterior use, as indicated.

1.02 REFERENCES

- A. U.S. Corps of Engineers CRP - C - 588
- B. ACI - 305, American Concrete Institute
- C. ACI - 306, American Concrete Institute

1.04 SUBMITTALS

- A. Product Data: Provide data on non-shrink grout.
- B. Submit certificate of compliance attesting to conformance of products to the requirements of this Section.
- C. Submit manufacturers' installation and application instructions for products.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, tightly sealed, polyethylene lined, multiple ply bags, clearly labeled with manufacturer's name, brand name and number, and batch number of the material.

1.06 JOBSITE CONDITIONS

- A. Ensure surfaces to be grouted or patched are clean and sound, and are not feathered at edges. Handle grout as concrete with regard to temperature and curing, as specified in Section 03300.
- B. Observe safety precautions as outlined in the manufacturer's literature and as printed on containers and labels.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Premixed grout comprised of blended portland cements, graded silica aggregates, special plasticizing agents and other ingredients.
- B. Conform to requirements of U.S. Corps of Engineers CRD-C-588 and to the following performance requirements listed in Article 2.02 when tested at the moderate fluidity, flowable, level.
- C. The grout shall exhibit a small but predictable amount of expansion sufficient to counteract the normal shrinkage of cement, and shall be dimensionally stable. The expansion shall

occur after initial set to insure maximum contact between grout and base plates. The grout shall be extremely flowable at low water levels and shall not bleed at the moderate fluidity level specified nor exhibit segregation of aggregates. At a highly flowable consistency, high compressive strength shall be attainable in a 24-hour period with continuous build-up for 28 days. The resulting cured material shall be very hard and highly resistant to penetration and breakdown by oils, water or vibration grout shall contain no iron particles, gypsum, gas forming agents, no added chloride, and shall not react with magnesium.

2.02 PERFORMANCE REQUIREMENTS

- A. When tested as provided herein, grout shall meet the following performance requirements:
 - 1. When tested as provided herein, grout shall meet the following performance requirements:
 - 1. Expansion at 3, 14, and 28 days: 0.4 percent maximum at any of these ages.
 - 2. Expansion at 3 and 14 days: not greater than expansion at 28 days.
 - 3. Shrinkage at 28 days: none, these requirements will be met if expansion tests give a positive value at 28 days.
 - 4. Compressive strength:
 - a. At seven days: 2500 psi min.
 - b. At 28 days: 5000 psi min.
 - 5. Time of final setting: eight hours max.
 - 6. Moderate fluidity, flowable: 124-145 (flow table, 5 drops, CRDC-277).

2.03 DEGREASING AND ETCHING CHEMICAL

- A. Composition and Materials: Blend of organic and inorganic acids with a special solvent system incorporating wetting agents for emulsification.
- B. Color: Water White
- C. Flash Point: Above 150°F
- D. Weight per gallon: 9.0 Pounds

PART 3 EXECUTION

3.01 PREPARATION OF CONCRETE SURFACES

- A. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials by mechanical abrasion methods such as sandblasting. Sandblast structural and reinforcing steel to remove loose material and expose sound metal.
- B. If the concrete surfaces are sound and it is only necessary to remove laitances, grease or dust, the Contractor may, with the prior written approval of the Engineer, forego sandblasting and wash the concrete with a degreasing and etching chemical applied in accordance with the manufacturer's written instructions and as specified herein.
- C. Application of Degreaser and Etching Compound. Prewet concrete surfaces with clean water. Brush concentrated cleaner onto concrete surface. Let stand three to four minutes and

reapply, brushing stained areas vigorously. Rinse off with fresh water applied at a minimum pressure of 800 psi and a minimum volume of five gallons per minute.

- D. Construct appropriate sturdy forms to contain grout at the fluidity level at which it will be used. Saturate foundations and forms for a minimum of six hours prior to grouting. Remove all standing water or puddles prior to application of grout. Take special care to eliminate water from bolt holes and other cavities.

3.02 MIXING

- A. Mix only with cool, clean, drinkable water. Do not overwater grout. Do not mix more grout than can be properly placed within 20 minutes of mixing.

3.03 APPLICATION

- A. Place grout only from one side of base plates to avoid entrapping air. Provide adequate air vent holes in large base plates. Work or flow grout into place, filling all cavities. Shut down near-by equipment which may cause vibration. Allow adequate curing time for strength development before placing a load on the grout.
- B. Place grout within twenty minutes of the addition of water to the batch.
- C. Reinforce grout pads or applications three inches or more in thickness with wire mesh or reinforcement bars.
- D. Rodding or chaining is acceptable to assist in placement or consolidation of grout. Excessive mechanical vibration may cause segregation of aggregates and will not be permitted.
- E. Cool mixing water and grout when temperature exceeds 80°F. in the area to be grouted. Comply with ACI-305. Cure and seal exposed grout with epoxy membrane curing compound to prevent rapid surfacing drying, shrinkage and cracking, or damp cure the grout.
- F. Heat mixing water and grout when temperature falls below 50°F in the area to be grouted. Do not exceed 80°F. Comply with ACI-306. Do not add accelerators to grout.

3.04 AGGREGATE EXTENSIONS

- A. Where indicated, extend the yield of expansive-cement type grout by utilizing aggregate filler in the size range of 3/8 inch washed pea gravel. Run trial mixes verifying the acceptability of this extended grout mix to the Engineer prior to use.

END OF SECTION

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DIVISION 05

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SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to fabricate, furnish, erect, set, fasten and install miscellaneous metalwork as indicated on the Drawings and as specified.

B. Related Sections

- a. Section 03300 – Cast In Place Concrete
- b. Section 15050 – Pipe Penetrations

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A36, Specification for Carbon Structural Steel.
2. A48, Specification for Gray Iron Castings.
3. A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded Seamless.
4. A123, Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
5. A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
7. A276, Specification for Stainless Steel Bars and Shapes.
8. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
9. A325, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
10. A489, Specification for Carbon Steel Lifting Eyes.
11. A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. A501, Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
14. B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
15. B308, Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
16. B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
17. B632, Specification for Aluminum-Alloy Rolled Tread Plate.
18. B660, Standard Practices for Packaging/Packing of Aluminum and Magnesium Products.

19. F436, Specification for Hardened Steel Washers.
20. F468, Specification for Nonferrous Bolts, Hex Cap Screws, Studs for General Use.
21. F593, Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
22. F594, Specification for Stainless Steel Nuts.
23. F844, Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

1.03 SUBMITTALS

A. In accordance with Section 01300 submit the following:

1. Manufacturer's technical data sheets for the following:
 - a. Bitumastic coating.
 - b. Grout.
 - c. Chemical Anchors
2. Shop Drawings:
 - a. Details of the fabrication and erection of each metal fabrication indicated on the Drawings.
 - b. Plans, elevations, sections, and details of metal fabrications and their connections.
 - c. Anchorage and accessory items.
 - d. The shop drawings shall furnish the required information in sufficient detail and completeness that the work may be accomplished without the use of the Contract Drawings as a reference.
3. Welding Certificates: Copies of certificates for welding procedures and personnel.
4. Qualification Data: Firms and persons specified in the "Quality Assurance" Article shall demonstrate their capabilities and experience. Firms shall include a list of at least three (3) recently completed projects with project names and addresses. The name, address, and phone number of a contact (architect, engineer, or owner) shall be provided for each project in the list, as well as any other required information hereinafter or hereinbefore specified.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications:

1. Fabrication Company to be experienced in the production of metal fabrications similar to those indicated for this Project, with a record of successful in-service performance.
2. Fabrication Company to possess sufficient production capacity to produce the work required and complete the work within the duration of the contract.

B. Welding:

1. Procedures and personnel shall be qualified according to the latest revisions of the following American Welding Society designation:
 - a. AWS D1.1, Structural Welding Code - Steel.
 - b. AWS D1.2, Structural Welding Code - Aluminum.

- c. AWS D1.6, Structural Welding Code - Stainless Steel.
- d. Certification shall be provided stating that each welder has passed the AWS qualification tests for the welding processes involved and has maintained that certification as required by AWS.

1.05 DELIVERY STORAGE AND HANDLING

- A. Aluminum to be delivered to the fabricator in accordance with ASTM B 660, complying with the commercial packing and preservation requirements.
- B. Epoxy Adhesive
 - 1. Store epoxy cartridges on pallets or shelving in a covered storage area.
 - 2. Control temperature above 60 degrees F and dispose of cartridges if shelf life has expired.
- C. Vinyl Ester Products
 - 1. Store components on pallets or shelving in a covered storage area with locking door.
 - 2. Control temperature within 41 to 77 degrees F and dispose of product if shelf life has expired.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit within reinforced concrete walls and other construction, dimensions shall be verified by field measurements before fabrication. The fabrication schedule shall be coordinated with the Construction Progress Schedule to avoid delaying the Work.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, proceed with fabricating metal fabrications upon receipt of Engineer reviewed and approved shop drawings, without field measurements. Allowance shall be made for trimming and fitting.

1.07 SCHEDULING

- A. Installation of anchorages for metal fabrications shall be coordinated with the Contractor. Setting drawings, templates, and instructions for installing anchorages, including sleeves, concrete inserts, anchor bolts, items with integral anchors, and any items that are to be embedded in concrete shall be provided to the Contractor. Items to be embedded in concrete shall be delivered to Project site sufficiently in advance to allow time for installation, as determined by the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel, in accordance with the following ASTM Designations unless otherwise indicated:
1. Steel plates and structural shapes ASTM A36.
 2. Steel Pipe A501 or A53, Type E or S,
Grade B
 3. Structural Steel Tubing A500, Grade B
 4. Steel Bolts and Nuts:
 - a. Carbon Steel A307 or A36
 - b. High-Strength A325, Type 3
 - c. Galvanized Steel Bolts and Nuts A307 or A36, with A153
Zinc Coating, and ANSI B1.1
 - d. Eyebolts A489
 - e. Threaded Rods A36
 - f. Flat Washers (Unhardened) F844; use A153 for Zinc
Coating
 - g. Flat Washers (Hardened) F436
- B. Stainless Steel, Type 316 and in accordance with the following ASTM designations unless otherwise indicated:
1. Bars and Shapes A276, AISI Type 316
 2. Plate, Sheet, and Strip A167, AISI Type 316
 3. Bolts and Threaded Rods F593, AISI Type 316,
 4. Nuts F594, AISI Type 316,
 5. Welding Rods and Bare Electrodes: Compatible with the material to be welded per the AWS D1.6 specifications.
- C. Aluminum, in accordance with the following ASTM designations and alloy and temper designations of The Aluminum Association:
1. Structural shapes B 308, 6061-T6 mill finish.
 2. Extruded shapes B 221, 6061-T6 mil finish
 3. Structural Plates B 209, 6061-T6 mil finish
 4. Sheets Alclad 3003-H14 and 3003
 5. Bolts and nuts F468, 2024-T4
 6. Aluminum Tread Plate:
 - a. In accordance with ASTM B 632, 6061-T6.
 - b. Provide a clear, Class II, anodized finish in accordance with Aluminum Association Designation AA-A31, 0.4 mils thick minimum.
 7. Structural Aluminum Tubes ASTM B 429, 6063-T52, mill finish.
 8. Welding Rods and Bare Electrodes:
 - a. Compatible with the material to be welded per the AWS D1.2 specifications.
 - b. Aluminum items to be anodized shall not be welded using 4043 weld rod.

D. Cast Iron

1. In accordance with ASTM A48, Class 35.

2.02 GROUT

- A. In accordance with SECTION 03600.

2.03 FASTENERS

- A. Provide Stainless steel fasteners for all connections unless indicated otherwise

B. Bolts:

1. Stainless steel in accordance with ASTM F 593, Alloy Group 2, Type 316,
2. CW with hexagonal heads shall be provided for connections.

C. Nuts:

1. Stainless steel in accordance with ASTM F 594, Alloy Group 2, Type 316,
2. CW with hexagonal heads, and thread designation to match stainless steel bolts shall be provided for connections.

D. Washers:

1. In accordance with ASTM F 436, except that the material shall be Type 316 stainless steel in accordance with ASTM A 276.

E. Stainless steel fasteners for framing connections

1. Provide bolts, nuts, and washers of the size and quantity as indicated on the Drawings. One nut shall be provided per each bolt unless otherwise indicated on the Drawings. A washer shall be provided at the contact surface between framing members or clips and the heads of bolts and nuts, minimum two (2) washers per bolt.

F. Machine Screws:

1. Stainless steel in accordance with ASME B18.6.3, Type 316.

2.04 ALUMINUM FRAMING AND SUPPORTS FOR COVERS AND GRATING

- A. Fabricated from structural aluminum shapes, structural aluminum tubes, and aluminum extrusions, of the size and quantity as indicated on the Drawings.

2.05 ABRASIVE NOSINGS

A. Aluminum.

1. In accordance with ASTM B221 for extrusions.
2. Class 30 for cast aluminum tread plate.

- B. Abrasive, Two (2) part Epoxy combined with aluminum oxide grit.
- C. Manufactured by Balco Inc, Wichita, KS or equal.

2.06 PIPE BOLLARDS

- A. Fabricated from Schedule 40, welded, galvanized steel pipe in accordance with ASTM A53
- B. Provide size and quantity indicated on the Drawings.

2.07 ALUMINUM ACCESS HATCH

A. General

- 1. Provide size and quantity indicated on the Drawings. The door leaf shall be 1/4-inch aluminum diamond pattern plate to withstand a live load of 300 pounds per square foot and an AASHTO HS20 loading unless specified or indicated otherwise on the Contract Drawings.

B. Construction

- 1. Channel frame shall be 1/4-inch aluminum with an anchor flange around the perimeter.
- 2. Door(s) shall be 1/4-in. aluminum diamond plate, reinforced to withstand a 25-foot column of stationary water
- 3. Stainless steel cam locks shall be provided to work in conjunction with a 9/16-in. diameter EPDM compression gasket, mounted to the underside of the door. Door shall open to 90 degrees and automatically lock with a T-316 stainless steel hold-open arm with an aluminum release handle.
- 4. All hardware shall be stainless steel.
- 5. Factory finish shall be mill finish with bituminous coating applied to exterior portions of the frame which will be in contact with concrete.

C. Warranty

- 1. Manufacturer shall guarantee against defects in materials and/or workmanship for lifetime of the hatch.

D. Manufacturer

- 1. The access hatch shall be type F1H as manufactured by the Halliday Products of Orlando, Florida or be an acceptable equivalent product.

E. Fall Protection Grating System

- 1. Furnish and install on all vault access doors fall protection grating system. Door manufacturer shall install the grating system when the door is fabricated or field install (by others) on existing doors already in use. If field installation is necessary, grating system shall be installed per the manufacturer's instructions.
- 2. Performance characteristics:

- a. Grating panel(s) shall be high visibility in color.
 - b. Grating panel(s) shall lock automatically in the full open position.
 - c. Grating system shall have a twenty-five year warranty.
 - d. Grating panel(s) shall have a provision for locking to prevent unauthorized opening.
3. Grating: Panels shall be aluminum with a powder coat paint finish and designed to meet OSHA OSHA 29 CFR 1926.502(c) requirements for fall protection.
 4. Hold open feature: A Type 316 stainless hold open device shall be provided to lock the cover in the fully open 90 degree position.
 5. Hardware: All hardware shall be Type 316 stainless steel.

2.08 WALL SLEEVES

- A. In accordance with SECTION 15050.

2.09 ANCHOR BOLTS

- A. To be Stainless Steel.
- B. Configuration and specific type as specified, as listed in the associated equipment specifications and as detailed on the Contract Drawings.
- C. Provide Antiseizing Lubricant for all stainless steel threads.
- D. Anchor Bolt Sleeves

1. High Density Polyethylene Plastic:
 - a. Single unit construction with deformed sidewalls such that the concrete and grout lock in place.
 - b. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
 - c. Material requirements:
 - 1) Plastic: High density polyethylene.
 - 2) Density: ASTM D 1505
 - d. Manufacturer:
 - 1) Sinco West, Simi Valley, CA
 - 2) Or equal
2. Fabricated Steel Sleeve
 - a. A 36 steel.

E. Neoprene Gasket

1. ASTM D 1056 RE-41-E, soft, closed-cell, neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown.
2. Thickness: Minimum 1/4 inch.
3. Furnish without skin coat.

4. Furnish two spare gaskets for each location shown requiring neoprene gaskets, and furnish one roll of 4-inch wide by 50-foot long neoprene gasket material with 1 pint of manufacturer's recommended adhesive.
5. Manufacturers and Product:
 - a. Rubatex Division of Great American Industries, Bedford, VA; Rubatex No. R-411-N.
 - b. Garlock Manufacturing, San Francisco, CA.
 - c. Or equal.

2.10 CHEMICAL ANCHORING SYSTEMS

A. Epoxy Anchors

1. Anchor Rod: Stainless steel threaded rod free of grease, oil or other deleterious material with a 45-degree chisel point.
2. Epoxy Adhesive:
 - a. ASTM C 881, Type 1, Grade 3, Class A, B, or C.
 - b. Two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse freeze/thaw environments and gray in color.
 - c. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
3. Mixed Epoxy Adhesive: Nonsag paste consistency, with ability to remain in a 1-inch diameter overhead drilled hole without runout, having the following properties:
 - a. Slant Shear Strength, ASTM C 881, No Failure In Bond Line, Dry/Moist Conditions: 5,000 psi.
 - b. Compressive Strength, ASTM D 695; 14,000 psi, minimum.
 - c. Tensile Strength, ASTM D 695: 4,500 psi.
 - d. Heat Deflection Temperature, ASTM D 648 E2: 135 degrees F, minimum.
4. Epoxy Adhesive Packaging:
 - a. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.
 - b. Cartridge Markings: Include manufacturer's name, batch number, mix ratio by volume, product expiration data, ANSI hazard classification, and appropriate ANSI handling precautions.
5. Manufacturer's and Products:
 - a. Adhesives Technology Corp.; Anchor-It Fastening Systems, HS 200 Epoxy Resin.
 - b. ITW Ramse/Red Head; Epcon Ceramic 6 Epoxy Anchor System.
 - c. Covert Operations; CIA Epoxy Anchors with viscosity to suit application.
 - d. Rawplug Co., Inc.; Rawl/Sika Foil Fast Epoxy Injection Gel System.

B. Adhesive Anchors

1. Two-component vinyl ester adhesive, insensitive to moisture, designed to be installed in adverse freeze/thaw environments.

2.11 LIFTING HOOKS

A. Supported from concrete:

1. Fabricated of 3/4-inch diameter steel rod bent in U shape and threaded at ends to receive nuts.
2. Fasten hook to 1/2-inch by 4-inch by 11-inch steel anchor plate.
3. Provide hooks hot-dip galvanized after fabrication.

B. Supported from steel:

1. Fabricated of 3/4-inch diameter steel rod bent in U shape and threaded at both ends to receive nuts.
2. Provide hooks hot-dip galvanized after fabrication.

2.12 MISCELLANEOUS ITEMS

- A. Provide hangers, supports, brackets, anchors, bolts and other miscellaneous metalwork not previously specified, of the shape, size, material and detail indicated on the Drawings for the purpose intended.

2.13 FABRICATION

A. General

1. Metals shall be sheared and punched cleanly and accurately. Burrs shall be removed.
2. Exposed edges shall be rounded to a radius of approximately 1/32 inch, unless otherwise indicated. Bent-metal corners shall be formed to the smallest radius possible without causing grain separation or otherwise impairing the work.
3. Corners and seams shall be welded continuously to comply with the following:
 - a. Materials and methods shall be used that minimize distortion and develop strength and corrosion resistance of the base metals.
 - b. Fusion shall be obtained without undercut or overlap.
 - c. Welding flux shall be removed immediately.
 - d. At exposed connections, exposed welds and surfaces shall be finished smooth and blended so that no roughness is apparent and the contour of the welded surface matches that of the adjacent surface.
4. Joints that will be exposed to weather shall be fabricated in a manner to exclude water. Drain holes shall be provided where water may accumulate.
5. Fabrications exposed to view in the completed Work, shall be provided with smooth, flat surfaces without blemishes.
6. Fabrications with exposed pitting, seam marks, roller marks, rolled trade names, or roughness shall not be used.

B. Shop Assembly:

1. Items shall be preassembled in shop to greatest extent possible to minimize field splicing and assembly.

2. Units shall be disassembled only as necessary for shipping and handling limitations.
3. Connections shall maintain the structural value of joined pieces through the use of properly sized holes, proper spacing and gage distances, tolerances, and other requirements as determined in the applicable codes listed elsewhere in this specification.
4. Units shall be clearly marked for reassembly and coordinated installation.

2.14 FINISHES

- A. Fabrications shall be finished after shop assembly.
- B. Anodized aluminum finishes to be in accordance with the Aluminum Association's standards for Anodized Architectural Aluminum as published by the American Architectural Manufacturer's Association (AAMA).
- C. Anodized finishes damaged in the field during installation or transit shall be repaired using brush anodizing to restore the coating to its specified Class and thickness.
- D. Galvanizing
 1. Items of miscellaneous ironwork and steel work indicated on the Drawings or specified to be galvanized shall be zinc-coated by the hot-dip process in accordance with ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123; or ASTM Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, Designation A153, as appropriate.
- E. Aluminum Surfaces in Contact with Concrete
 1. Paint-on coating suitable for embedment in, or surface mounting to, concrete to prevent adverse reaction between aluminum and concrete surfaces.
 2. Apply one coat of the following:
 - a. Coal Tar 46-465 H. B. Tnemecol, Tnemec Company, North Kansas City, MO.
 - b. Bitumastic Super Service Black, KOP-COAT, Inc., Pittsburgh, PA.
 - c. Tarmastic 100 Porter Coatings Division, Porter Paint Co., Louisville, KY.
 - d. Or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Field Assembly:
 1. Metal fabrications shall be cut, reinforced, drilled, and tapped cleanly and accurately to receive finish hardware, screws, and similar items.

2. Exposed work shall be formed true to line and level, with accurate angles and surfaces, and straight rounded edges.
3. Sharp or rough areas shall be removed on exposed traffic surfaces.
4. Exposed connections shall be formed with hairline joints, flush and smooth, using concealed fasteners where possible.
5. Exposed fasteners of type indicated on the Drawings shall be used; when not indicated, Phillips flat-head (countersunk) screws or bolts shall be used. Joints shall be located where least conspicuous.

B. Erection Tolerances

1. Maximum Variation from Plumb: 1/4 inch per story, noncumulative.
2. Maximum Offset from True Alignment: 1/4 inch.

C. Anchorage:

1. Coordinated type of anchorage with supporting structure.
2. Anchoring devices shall be fabricated and spaced to secure metal fabrications in place and to support indicated loads.

D. Fastening to In-Place Construction:

1. Anchorage devices and fasteners shall be provided where necessary for securing metal fabrications to in-place construction.

E. Cutting, Fitting, and Placement:

1. Cutting, drilling, and fitting for the installation of metal fabrications shall be performed as required.
2. Metal fabrications shall be set accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

F. Temporary bracing or anchors shall be provided in formwork for items that are to be built into concrete.

G. Exposed connections shall fit together to form hairline joints. Welded connections that can not be made in the shop due to shipping limitations shall be made in the field. Do not weld, cut, or abrade surfaces of exterior units that have been anodized after fabrication and are for bolted or screwed field connections.

H. Field Welding: Comply with the following requirements:

1. Materials and methods shall be used that minimize distortion and develop strength and corrosion resistance of base metals.
2. Fusion shall be obtained without undercut or overlap.
3. Welding flux shall be removed immediately.
4. At exposed connections, welds and surfaces shall be finished smooth and blended so that no roughness shows after finishing and the contour of the welded surface matches that of adjacent surface.

3.02 SETTING BEARING AND LEVELING PLATES

- A. Concrete bearing surfaces shall be cleaned of bond-reducing materials, and roughened to improve bond to surfaces. The bottom surface of plates shall be cleaned.
- B. Bearing and leveling plates shall be set on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, anchor bolts shall be tightened. Wedges and shims shall not be removed but, if protruding, shall be cut off flush with the edge of bearing plate before packing with grout.
 - 1. Provide grout in accordance with SECTION 03600.
 - 2. Grout shall be solidly packed between bearing surfaces and plates to ensure that no voids remain.

3.03 ANCHOR BOLTS (CAST IN PLACE)

- A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.
- B. Use sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt. Minimum bolt size: 1/2-inch diameter by 12 inches long, unless otherwise shown.
- C. All anchors and anchor bolts shall be properly located and shall be built into the connecting work when the work is built. Expansion bolts shall be inserted into drilled holes.

3.04 ANCHORING SYSTEMS (CURED CONCRETE)

- A. Begin installation only after concrete or masonry receiving anchors have attained design strength.
- B. Do not install an anchor closer than six times its diameter to either an edge of concrete or masonry, or to another anchor, unless specifically shown otherwise.
- C. Install in accordance with manufacturer's specific quality control submittal instructions. Hole diameters are critical to installation, use only drills recommended by anchor manufacturer. Follow manufacturer's safe handling instructions.
- D. Epoxy or Adhesive Anchors: Do not install when temperature of concrete is below 40 degrees F or above 100 degrees F, unless stated otherwise in manufacturer's written instructions.
- E. Follow specific manufacturer safe handling practices when handling and installing concrete anchors.

3.05 FASTENER SCHEDULE:

<u>Service Use and Location</u>	<u>Product</u>	<u>Remarks</u>
Anchor Bolts Cast Into Concrete for Equipment Bases:		
Dry Areas	Stainless steel bolts, unless otherwise specified with equipment	
Submerged or Wet Areas	Stainless steel bolts with fusion bond coating unless otherwise specified with equipment	See Section 09900, Painting and Protection Coating
Anchor Bolts Cast Into Concrete for Metal Fabrications and Structural Components.		
Dry or Protected Areas Exterior, Wet, Washdown, and Chemical Handling Areas	Stainless steel bolts with fusion bond coating	See Section 09900, Painting
Anchors for Metal Components to Concrete: e.g. Electrical Panels and Equipment:		
Dry Areas	Stainless steel wedge or expansion anchors	
Wet and Damp Areas	Epoxy or adhesive stainless steel anchors	
Submerged or Buried in Earth	Epoxy or adhesive stainless steel anchors	
Connections for Structural Steel Components:		
Exterior and Interior	High-strength zinc-coated steel bolts	See Section 05120, Structural Steel
Connections for Steel Fabrications:		
Exterior and Interior	Zinc-coated steel bolts	See Section 05120, Structural Steel
Connections for Aluminum Components:		
Exterior and Interior	Stainless steel bolts	
All Others:		
Exterior and Interior	Stainless steel fasteners	

A. Do not use epoxy anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

3.06 ABRASIVE NOSINGS

A. Provide abrasive nosings on concrete steps not being supplied or coated with another type of nosing or nonskid material.

3.07 ACCESS COVERS AND HATCHES

A. Accurately position prior to placing concrete, such that covers and hatches are flush with floor surface.

B. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.

3.08 PIPE BOLLARDS

- A. Anchored in place with concrete footings as detailed in the Contract Drawings. Bollards shall be supported and braced in position until their footings are cured.
- B. Fill pipe solidly with 3,000 psi concrete, mounding the top surface.
- C. Paint bollards Safety Yellow in accordance with:
 - 1. Exterior Steel - Non-Immersion
 - a. Shop Surface Preparation: SSPC SP6 Commercial Blast Cleaning
 - b. Shop Primer Coat: Series 91-K97 Organic Zinc
 - 1) Dry Film Thickness: 2.5 to 3.5 mils
 - c. Full Field Prime Coat: Series 66-color Hi-Build Epoxoline
 - 1) Dry Film Thickness: 3.0 to 5.0 mils
 - d. Finish Coat: Series 73-color Endura-Shield
 - 1) Dry Film Thickness: 2.5 to 5.0 mils
 - e. Total Dry Film Thickness: 8.0 to 13.5 mils.

3.09 ANGLE PROTECTION

- A. Provide galvanized structural steel angels and strap anchors as indicated and specified.

3.10 MISCELLANEOUS ITEMS

- A. Metal Fabrication Subcontractor shall furnish items to be embedded in the Work to the Contractor for installation.

3.11 ALUMINUM WORK PROTECTION

- A. Areas where the coating has been damaged by abrasion or other cause shall be cleaned and repainted as directed so that the aluminum will have a complete protective film when brought into contact with the material against which it is being protected. Before application of coating, the surface shall be cleaned of all dirt, heavy deposits of grease or oil, and other foreign substances, and shall be immersed in or swabbed with an acceptable solvent. Next, the surfaces shall be rinsed with clear water and thoroughly dried.
- C. Protect against electrolysis where aluminum is to be used in conjunction with dissimilar metals.
- D. Where a shop coating of methacrylate lacquer has been specified on aluminum work to protect the surface from stain, the protective coating of lacquer worn off due to handling or erection shall be replaced in the field by a new coating of lacquer of the same type.

- E. During construction, care shall be taken to prevent damage to the aluminum work from splashing or by the accumulation of paint, concrete, mortar, or other similar materials.

3.12 CLEANING AND TOUCHUP

- A. Painted Surfaces: Clean and touchup paint field welds, bolted connections, and abraded areas of shop paint as specified in SECTION 09900 or as approved by the Engineer.
- B. Anodized Surfaces: Clean field welds, bolted connections, and abraded areas and repair anodizing to match the quality of the coating provided by the shop.
- C. After aluminum has been erected, it shall be cleaned with mild soap and water, followed by a clear water rinse.

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DIVISION 09

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SECTION 09900

PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for preparation and finishing of surfaces to be painted.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM).
 - 1. D16, Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products
- B. Steel Structures Painting Council (SSPC).
 - 1. SP-1, Solvent Cleaning.
 - 2. SP-2, Hand Tool Cleaning.
 - 3. SP-3, Power Tool Cleaning.
 - 4. SP-5, White Metal Blast Cleaning.
 - 5. SP-6, Commercial Blast Cleaning.
 - 6. SP-7, Brush-Off Blast Cleaning.
 - 7. SP-10, Near-White Blast Cleaning.

1.03 DEFINITIONS

- A. In accordance with ASTM-D16.
- B. Wherever the words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, or “blast cleaning”, or words of similar intent are used in these specifications, it shall be understood to refer to the applicable SSPC Specification.
- C. The term “paint” or “coating” as used in this specification includes emulsions, enamels, paints, stains, varnishes, sealers, and other coatings, organic or inorganic, used as prime, intermediate or finish coats.

1.04 SUBMITTALS

- A. Shop Drawings
 - 1. Submit product data and manufacturers application instructions in accordance with SECTION 01300.
- B. Samples
 - 1. Colors as required.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer specializing in the production of paint and coatings for 10 years, minimum.
2. Applicator specializing in commercial, industrial and municipal painting for 5 years, minimum.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading

1. In accordance with manufacturers recommendations.

B. Acceptance at Site

1. Products to be delivered to site in sealed, labeled and unopened containers.
2. Labels to include Name, type, code, coverage, surface preparation, drying time, color, clean up procedure, and mixing and reducing instructions.
3. Remove unacceptable products immediately.

C. Storage and Protection

1. Store materials between minimum ambient temperature of 45 degrees F. and a maximum of 90 degrees F.
2. Storage area to be well ventilated, or as required by manufacturer.

1.07 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Provide continuous ventilation and maintain ambient temperature above 45 degrees F., for 24 hours before, during, and 48 hours after application of finishes, unless otherwise required by coating manufacturer.
2. Do not apply coatings when exposed to rain or snow, or when relative humidity is above 50 percent.
3. Minimum application temperature for Latex paints:
 - a. 45 degrees F. for interiors.
 - b. 50 degrees F., for exteriors
4. Minimum application temperatures for other coatings:
 - a. 65 degrees for interior and exterior.
5. Lighting levels to be 80 ft. candles, measured mid height at substrate surface.

1.08 MAINTENANCE

A. Extra Materials

1. Provide 1 gallon each color to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Paints by the Tnemec Company, Kansas City, Missouri have been used as the basis for the paint schedule, other manufactures considered equal:
 - 1. Valspar Coatings,
 - 2. Carboline.
 - 3. or product deemed equivalent by the Engineer.

2.02 MATERIALS

- A. Coatings
 - 1. Ready Mixed, except field catalyzed coatings.
 - 2. Process pigments to a soft paste like consistency, capable of being dispersed to a uniform coating.
 - 3. Readily applied by spray or brush.
 - 4. Dry free of streaks or sags.
- B. Accessories
 - 1. Linseed Oil, Shellac, Turpentine, Thinners to be of commercial quality, compatible to coatings used.

2.03 COLORS AND FINISHES

- A. Colors selected by the Owner from color chips submitted by the Contractor for review. The selection shall be in the form of a color schedule indicating the colors to be used on the various surfaces. The colors used in the final Work shall match the selected color chips.
- B. In general the finish coat shall be gloss or semi-gloss on metal work and flat finish on masonry, wood and drywall surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site Verification of Conditions
 - 1. Verify surfaces are ready to receive work in accordance with manufacturers recommendations.
 - 2. Report conditions which may affect proper application to Engineer.
 - 3. Measure moisture content of substrates.
 - 4. Do not apply coatings when moisture exceeds levels below:
 - a. Plaster and Gypsum wallboards 12 percent.
 - b. Masonry and Concrete 12 percent
 - c. Wood 14 percent

3.02 PREPARATION

A. Protection

1. Protect elements surrounding the Work required by this section from damage or marking.
2. Repair damage to other surfaces caused by Work of this section.
3. Furnish drop cloths, shields, and protective methods to prevent spray or paint spatter from disfiguring other surfaces.

B. Preparation of surfaces to be coated

1. General
 - a. Remove electrical plates, light fixtures, hardware, and fittings.
 - b. Correct minor defects and clean surfaces.
 - c. Seal marks which may bleed through surface finish.
2. Impervious Surfaces
 - a. Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach.
 - b. Rinse with clean water.
 - c. Allow to dry.
3. Aluminum
 - a. Remove surface contamination by steam or high pressure water.
 - b. Remove oxidation by sanding and solvent washing.
4. Insulated coverings
 - a. Remove dirt, grease, and oil from canvas and cotton.
5. Concrete
 - a. Blast-trak or brush blast.
6. Wood
 - a. Remove dirt, oil, and other soil with scrapers, mineral spirits, and sand paper.
 - b. Sand surfaces exposed to view, and remove all sanding dust.
7. Gypsum board
 - a. Fill minor defects with latex fill.
 - b. Prime repaired areas.
8. Galvanized surfaces
 - a. Remove contamination and oils with solvent wash.
 - b. Sand and remove sanding dust.
9. Masonry and Concrete
 - a. Allow 28 days curing prior to coating application.
 - b. Remove dirt, loose mortar, scale, salt, alkali powder or other foreign matter.
 - c. Remove oil and grease with solution of tri-sodium phosphate.
 - d. Rinse with water.
 - e. Allow to dry.
 - f. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water.
 - g. Allow to dry.
10. Uncoated steel and iron
 - a. Remove grease, scale, dirt and rust.
 - b. Remove heavy scale and rust with wire brushing or sandblasting.
 - c. Clean by washing with solvent.
 - d. Apply treatment of phosphoric acid solution.
 - e. Clean welds, bolts and nuts in a similar fashion.
 - f. Spot prime repaired areas.
11. Shop primed steel

- a. Remove loose primer and rust by sanding or scraping.
 - b. Feather edges to make touch-up patches inconspicuous.
 - c. Clean surfaces with solvent.
 - d. Prime bare steel.
12. Stainless steel surfaces shall not be painted.

3.03 COATING APPLICATION

A. General

- 1. Apply in accordance with manufacturers recommendations.
- 2. Apply each coat to uniform finish.
- 3. Apply each coat slightly darker than preceding coat, unless instructed otherwise by the Engineer.
- 4. Sand lightly between coats.
- 5. Allow preceding coat to dry prior to application of next coat.
- 6. Prime back surfaces of all woodwork.

3.04 MECHANICAL AND ELECTRICAL EQUIPMENT

A. General

- 1. Paint shop primed equipment with compatible finish coat.
- 2. Remove or mask items not to be painted.
- 3. Prime and finish all associated pipes, and ducts, both insulated and exposed, all hangers, brackets, collars and supports, unless items are pre finished.
- 4. Do not paint identification markings or tags on equipment.
- 5. Paint exposed conduit and piping in finished areas.
- 6. Paint both sides and edges of plywood mounting boards.
- 7. Reinstall all trim, fittings, plates ect. After painting is complete.

B. Color Code

- 1. Piping and equipment in accordance with Article 3.06 of this specification.

C. Identification

- 1. Label piping by contents and arrows indicating direction of flow.
- 2. Labels to be twenty feet (20) apart maximum, and within each space through which pipe line passes.
- 3. Adjacent to each side of walls which pipeline penetrate.
- 4. Adjacent to valves, equipment, and pumps.
- 5. Locate labels where they are unobstructed from view and visible from valves.
- 6. Colors to be white or black as appropriate for the substrate.
- 7. Letters, numbers and flow arrows to be stenciled to pipeline and equipment or die cut from vinyl film as approved by the Engineer.

8. Lettering size as follows:	Pipe Diameter in Inches	Size of Letters in Inches
	3/4 to 1-1/4	1/2
	1-1/2 to 2	3/4
	2-1/2 to 6	1-1/2
	8 to 10	2-1/2
	Over 10	3

D. Metal tags

1. Pipelines smaller than 3/4 inches in diameter and for valves, securely fasten brass tags, 2-1/2 inches x 1/2 inches, with etched lettering filled with enamel paint.

3.05 CLEANING

- A. Promptly remove spilled, splashed and/or spattered paint.
- B. Maintain premises free of clutter, tools, equipment and material.
- C. Collect waste cloths and material which may constitute a fire hazard and remove daily from site.

3.06 COLOR SCHEDULES

A. Architectural

1. Chosen by Owner.

B. Piping

1. Water lines

Raw.....	Olive Green
Settled or Clarified.....	Aqua
Finished or Potable.....	Dark Blue
2. Chemical Lines Alum.....Orange

Caustic.....	Yellow with Green Band
Chlorine.....	Yellow
Fluoride.....	Light Blue with Red Band
Polymers.....	Orange with Green Band
Potassium Permanganate..	Violet
3. Waste Lines

Raw.....	Gray
Sludge.....	Brown
4. Miscellaneous

Compressed Air.....	Dark Green
Fuel Oil.....	Red

3.07 EXTERIOR COATING SYSTEM SCHEDULE

A. Miscellaneous Ferrous Metal Items

1. Shop surface preparation: SSPC-SP-10, Blast profile 1.5 - 2.5 mils.
2. 1st coat; (Shop applied)-Tnemec Hydro-Zinc 2000, DFT 2.5-3.0 mils.
3. 2nd coat (Field applied)-Tnemec Series 66 Epoxoline, DFT 4.0-6.0 mils.
4. 3rd coat (Field applied)-Tnemec Series 66 Epoxoline 66, DFT 4.0 to 6.0 mils.

B. Ferrous Metals Scheduled for Immersion Service

1. Shop surface preparation: SSPC-SP-10, Blast profile 1.5 - 2.0 mils.
2. 1st coat; (Shop applied)-Tnemec 66-1211 Red Primer, DFT 3.0 mils.
3. 2nd coat (Field applied)-Tnemec 104 H.S. Epoxy, DFT 6.0 to 10.0 mils.
Scarify 1st coat prior to 2nd coat application.
4. 3rd coat (Field applied)- Tnemec 104 H.S. Epoxy, DFT 6.0 to 10.0 mils.

C. Ferrous Metals Scheduled for Immersion Service in Potable Water, NSF approved

1. Surface preparation: SSPC-SP-10, Blast profile 1.5 - 2.0 mils.
2. 1st coat; (Shop applied)-Tnemec Hydro-Zinc 2000, DFT 2.5 to 3.5 mils.

3. 2nd coat (Field applied)-Tnemec Series 20-1255 Beige, DFT 3.0 to 5.0 mils.
4. 3rd coat (Field applied)- Tnemec Series 20-AA90 White, DFT 3.0 to 5.0 mils.

D. Galvanized Metal

1. Surface preparation: lightly scarify surface, solvent clean using Tnemec 41-4 solvent.
2. 1st coat: 66 Hi-Build Epoxyline, DFT 2.0 to 4.0 mils.
3. 2nd coat: 73 Endurashield, DFT 1.5 to 3.0 mils.

E. Concrete, and Concrete Block Masonry (New)

1. 1st coat: Tnemec Series 52 Tnemecrete, DFT 8.0 mils.
2. 2nd coat: Tnemec Series 52 Tnemecrete, DFT 8.0 mils.

F. Concrete, and Concrete Block Masonry (New), (Clear finish)

1. 1st coat: Tnemec Acrylic Sealer.
2. 2nd coat: Tnemec Acrylic Sealer.

G. Asphalt

1. 1 coat Traffic Marking Paint.

3.08 INTERIOR COATING SYSTEM SCHEDULE

A. Concrete Block

1. 1st coat: Tnemec 130-6602 Spray then back roll.
2. 2nd coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.
3. 3rd coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.

B. Concrete Walls and Ceilings

1. 1st coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.
2. 2nd coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.

C. Drywall

1. 1st coat: Tnemec 51-792 Sealer
2. 2nd coat: Tnemec Series 23 Enduratone.
3. 3rd coat: Tnemec Series 23 Enduratone.

D. Wood (to be painted)

1. 1st coat: Tnemec 36-603 Undercoat.
2. 2nd coat: Tnemec Series 23 Enduratone.
3. 3rd coat: Tnemec Series 23 Enduratone.

E. Metals, Structural Steel, Piping, Railways, Equipment, ect.

1. Shop surface preparation: SSPC-SP-6, Blast profile 1.5 - 2.0 mils.
2. 1st coat; (Shop applied)-Tnemec 66-1211 Red Primer, DFT 3.0 mils.
3. 2nd coat (Field applied)-Tnemec Series 66 Epoxoline, DFT 3.0 to 4.0 mils.
4. 3rd coat (Field applied)-Tnemec Series 73 Endura Shield, DFT 1.5 to 2.5 mils.

F. PVC Piping

1. Surface preparation: Scarify prior to coating.
2. 1st coat: Tnemec Series 66 Epoxoline, DFT 1.5 to 2.0 mils.
3. 2nd coat: Tnemec Series 66 Epoxoline, DFT 1.5 to 2.0 mils.

G. Non-ferrous Metals (Galvanized, Copper, ect.)

1. Surface preparation: Lightly scarify surface, solvent clean using Tnemec 41-4 solvent.
2. 1st coat: Tnemec 66 Epoxoline, DFT 1.5 to 3.0 mils.
3. 2nd coat: Tnemec 73 Endurashield, DFT 2.0 to 3.0 mils.

H. Canvas and Cotton Insulation Coverings.

1. 1st coat: Tnemec 51-792 Sealer.
2. 2nd coat: Tnemec Series 6 Tneme Cryl.
3. 3rd coat: Tnemec Series 6 or Series 7 Tneme Cryl.

I. Interior concrete tanks in contact with potable water.

1. Surface preparation: SSPC-SP-7 (Acid etching not allowed).
2. 1st coat: Fill large voids with Tnemec 63-1500 Filler/Surfacer.
3. 2nd coat: Tnemec Series 20-1255 Beige, DFT 3.0 to 5.0 mils.
4. 3rd coat: Tnemec Series 20-AA90 White, DFT 3.0 to 5.0 mils.

3.09 CHEMICAL MIXING, FEED AND STORAGE AREA

A. Concrete Containment walls, tank pads and floors.

1. Surface preparation: SSPC-SP-7 (Acid etching not allowed).
2. 1st coat: Fill large voids with Tnemec 120-5003 Filler/Surfacer.
3. 2nd coat: Prime all surfaces with Tnemec Series 120-5002 DFT 12.0 to 18.0.
3. 3rd coat: Tnemec Series 120-5001 Gray DFT 12.0 to 18.0.

3.10 PIPING COATING SYSTEM SCHEDULE

A. Ductile Iron

1. Surface preparation: Immersion Service-SSPC-SP-10
2. 1st coat: (Shop Applied) Tnemec Series 66-1211, DFT. 3.0 mils.
3. 2nd coat: (Field Applied) Tnemec 66, Color, DFT 4.0 mils.
4. 3rd coat (Field Applied) Tnemec Series 66 Color DFT 4.0 mils.

B. PVC

1. Surface preparation: Clean and dry.
2. 1st coat: Tnemec series 66, Hi-Build Epoxoline, DFT 4.0 to 6.0 mils.

C. Carbon Steel

1. Surface preparation: Immersion Service- SSPC-SP-10.
2. 1st coat: (Shop Applied) Tnemec Series 66-1211, DFT. 3.0 mils.
3. 2nd coat: (Field Applied) Tnemec 66, Color, DFT 4.0 mils.
4. 3rd coat (Field Applied) Tnemec Series 66 Color DFT 4.0 mils.

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DIVISION 11

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SECTION 11310

SUBMERSIBLE WET PIT SEWAGE PUMPS AND APPURTENANCES MYLES STANDISH

PART 1 GENERAL

1.01 SUMMARY

- A. This Specification is specifically for the Myles Standish Pump Station.
- B. Pump sized based on available record information. Test pits are to be completed prior to shop drawing submission to confirm piping diameters. Pumps are sized based on worst case scenario and may need to be modified.**
- C. Furnish, install, test and place into satisfactory operating condition wet pit submersible sewage pumps, guide rails, guide rails slide, straight through base connections, grab link assemblies, and control relays, each designed for pumping raw wastewater with minimum spherical diameter solids passage of 3”.

1.02 RELATED WORK

- A. Division 1 – General Requirements
 - 1. Section 01665 – Services of Manufacturer’s Representatives
 - 2. Section 01710 – Startup
 - 3. Section 01730 – Operations and Maintenance Manual
 - 4. Section 01750 – Spare Parts
 - 5. Section 01751 – Lubricants
- B. Division 9 - Finishes
- C. Division 13 – Instrumentation and Controls
- D. Division 15 - Mechanical
- E. Division 16 - Electrical Work

1.03 DESIGN REQUIREMENTS

- A. The Work shall include all accessories, and appurtenances necessary to make a complete system. Work shall conform to requirements for installation, materials, and equipment approvals of state, local, Underwriters' Laboratories, Inc., or other applicable codes, whether or not called for in detail on the drawings or in these specifications.
- B. All pump openings, internal passages, and internal recirculation ports shall be large enough to permit the passage of a sphere 4" in diameter, and any trash or stringy material which may pass through the average house collection system. Screens or any internal devices that create a maintenance nuisance or interfere with priming and performance of the pump shall not be permitted.

- C. Pumps and motors shall be capable of operating in a continuous submerged condition in vertical position in a wet pit installation. Pumps shall be mounted on a single 2-inch guide rail with slide bracket for easy removal without having to enter the wet well. A straight through 4-inch discharge shall be permanently connected to the 6-inch discharge pipe via an eccentric reducer located inside the wet well.
- D. Certified dimensional drawings indicating size and locations of the priming recirculation port or ports shall be submitted to the Engineer prior to shipment.
- E. New pumps shall be capable of performing under the following operating conditions:

Myles Standish Pump Station
2-Pumps (Submersible)

Pumps	Capacity (gpm)	TDH (ft)	Maximum Motor Horsepower	Maximum Speed (RPM)	Min Hydraulic Efficiency	Shut-off Head (ft)	Pump Runout
Single Pump Operation	495	52	12.1 ¹	1800	69%	88	680 gpm @ 42 ft

- 1: Motors rated 208 volts, 3 phase, Inverter duty rated, and XP rated.
- 2: Motor shall not overload over the entire length of the curve.
- 3: Information based on Sulzer XFP 100E PE75 submersible pump
- 3: **Test pits are to be completed prior to shop drawing submission to confirm piping diameters. Pumps are sized based on worst case scenario and may need to be modified.**

- F. The pumping units shall be designed to pump raw domestic sewage and discharge into a force main.

1.04 QUALITY ASSURANCE

- A. Pumps shall be the product of a single manufacturer with a minimum of ten years experience with equipment of the size and type specified operating in a similar arrangement.
- B. Equipment and accessories shall be the standard cataloged products of the manufacturer except as otherwise specified or indicated.
- C. Pump manufacturer to provide the submersible pump, pump base, guide rail slide brackets, upper guide brackets, straight through base connection, rails and appurtenances regardless of the manufacturer, as a complete and integrated package to insure proper coordination and compatibility of equipment.

1.05 SHOP TESTS

- A. Motor Tests

1. Motor factory shop tests shall be in accordance with IEEE Standard 112, Appendix A, plus the factory's standard routine tests for the specified motor horsepower.

B. Pump Tests

1. Certified Performance Tests: Conduct performance tests per HI Grade 1U on each pump and motor unit to determine head, capacity, speed, and brake horsepower at not less than six points on the operating curve including rating point and best efficiency point. Test data shall be sufficiently comprehensive to produce guaranteed performance curves showing head versus capacity, efficiency, and brake horsepower for the rated speed. Engineer shall be supplied with the complete test procedure in advance of the testing. Test shall be witnessed and certified by a professional Engineer.
2. Hydrostatic Pressure Tests: Conduct hydrostatic pressure tests on each pump.
3. Demonstrate that all equipment is capable of continuous operation in satisfactory manner without mechanical or electrical defects or operational difficulties under suction and discharge conditions.
4. Repeat tests, if necessary, until results are obtained satisfactory to the Engineer.
5. Correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.
6. Conduct all tests in accordance with the latest standards of the Hydraulic Institute.
7. If the specified tests indicate the pump or motor will not meet the specifications, the Engineer has the right to require complete tests for all pumps and motors at no additional cost to the Owner.

1.06 REFERENCES

- A. ASTM A48 - Standard Specification for Gray Iron Castings.
- B. ASTM A276 - Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
- C. AFBMA
- D. Hydraulic Institute Standards.
- E. National Electrical Manufacturer's Association.

1.07 SUBMITTALS

- A. Submit to the Engineer for approval as provided in Section 01300, shop drawings showing details of construction and installation of all equipment furnished under this Section. The following shall be included:
1. Shop drawings and materials of construction and performance of electric motors, pumps, controls, pipes, valves and fittings, equipment, conduit, wiring, wiring devices, transformer and access manhole, rails and bracket.
 2. Manufacturer's rating curves showing pump characteristics of pressure, capacity, brake horsepower, and efficiency. This information shall be prepared specifically for the pump proposed. Catalog sheet showing a family of curves will not be acceptable.
 3. Literature and drawings describing the equipment in sufficient detail, including materials of construction and parts list, to indicate full conformance with the detail specifications.
 4. Complete parts list for equipment furnished.
 5. Motor data such as HP, Volts, RPM, FLC, Efficiency, and p.f. as described herein.
 6. Complete wiring diagrams and schematics of all controllers, control panels, control devices, and operators furnished under this Section.
 6. Complete wiring diagrams and schematics of all power and control systems.
 7. Drawings depicting the mechanical seal configuration.
 8. Floor plans, sections and elevations showing a complete layout to scale of all equipment, piping, electrical conduits and wall sleeve installation locations and methods to provide watertight seals.
 9. Motor wiring diagrams for power and high temperature switches.
 10. Services of manufacturer's representative and warranties.
 11. Drawings and calculations indicating pipe support material, locations, and engineering data of support scheme.
- D. In the event that it is impossible to conform to certain details of the specifications due to different manufacturing techniques, describe completely all non-conforming aspects for review and approval by the Engineer.
- C. Submit under provisions of Section 01300.

D. Pump and Motor Characteristics and Performance Data:

1. Provide guaranteed certified performance curves based on actual shop tests of mechanically duplicate pumping units, showing they meet specified requirements for capacity, head, horsepower, efficiency, and NPSH. For units of same size and type, provide curves for a single unit.
2. Catalog performance curves at required speed showing maximum and minimum impeller diameters available.

E. Manufacturer's written warranty.

F. Shop Test Results: One (1) electronic copy of pump performance test data, pump performance curves, hydrostatic test results and motor test results.

G. Field Inspection Reports: Submit under provisions of Section 01700.

1.08 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Provide operation and maintenance instructions as specified in Section 01730. Note, both "Paper" and "Electronic" manuals are required.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of equipment.

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.

D. Inspect and inventory items upon delivery to site and provide Engineer with inventory list.

E. Store and safeguard equipment, material, and spare parts in accordance with manufacturer's instructions and deliver to Owner after completion of the work.

1.10 WARRANTY

A. The manufacturer shall guarantee the pumps free from defects in workmanship and materials for a period of 5 years (3 years 100% parts and labor, 2 years prorated at 75% year 4, 50% year 5) from date of startup, not to exceed 5 years 6 months from date of shipment.

PART 2 PRODUCTS

2.01 ACCEPTABLE PUMP MANUFACTURERS

- A. Sulzer
- B. Additional pump manufacturers may be considered acceptable alternatives. Documentation shall be submitted with Bids for review and approval by the Engineer that demonstrates compliance with project specifications, including dimensions, process mechanical, electrical, instrumentation and control.
- C. Should equipment which differs from the first named in this Section 2.01.A be offered and determined to be the equal of that specified, such equipment shall be acceptable only on the basis that any revision in the design and/or construction of the structure, piping, appurtenant equipment, electrical work, etc. required to accommodate such a substitution shall be made at no additional cost to the Owner and be as approved by the Engineer.

2.02 PUMP CONSTRUCTION

- A. Major pump components shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be stainless steel 1.4401 (AISI type 316) construction. All metal surfaces coming into contact with the pumped media (other than the stainless steel components) shall be protected by a factory applied spray coating of zinc phosphate primer followed by a high solids two part epoxy paint finish on the exterior of the pump. The pump shall be equipped with an open lifting hoop suitable for attachment of standard chain fittings, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), and shall be rated to lift a minimum of four times the pump weight. Sealing design for the pump/motor assembly shall incorporate machined surfaces fitted with Nitrile (Buna-N) rubber O-rings. Sealing will be the result of controlled compression of rubber O-rings in two planes of the sealing interface. Housing interfaces shall meet with metal-to-metal contact between machined surfaces, and sealing shall be accomplished without requiring a specific torque on the securing fasteners. Rectangular cross-sectioned gaskets requiring specific torque limits to achieve compression shall not be considered equal. No secondary sealing compounds shall be required or used.
- B. Impeller: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single vane design, with a minimum spherical solids passage size of 4 inches. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt shall be effectively recessed within the impeller bore to prevent disruption of the flow stream and loss of hydraulic efficiency. Impellers that use wear

rings and impellers that are enclosed channel design will not be accepted due to the nature of clogging.

- C. Self-Cleaning Wear Plates: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. Adjustment to allow for wear and restore peak pumping performance shall be accomplished using standard tools, and without requiring disassembly of the pump. The use of fixed or non-adjustable wear plates or rings, or systems that require disassembly of the pump or shimming of the impeller to facilitate adjustment shall not be considered equal. The suction flange shall be integrated into the wear plate and its bolt holes shall be drilled and threaded to accept standard 4 inch ANSI class 125 flanged fittings.
- D. Premium Efficiency Motor: The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 and NEMA Premium. Motor rating tests shall be conducted in accordance with IEC 60034-2-1 requirements and shall be certified accurate and correct by a third party certifying agency. A certificate shall be available upon request. Motors that are rated IE2 or IE1 will be rejected.

The Premium Efficiency motor shall be housed in a watertight gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) enclosure capable of continuous submerged operation underwater to a depth of 20 meters (65 feet), and shall have an IP68 protection rating. The motor shall be of the squirrel-cage induction design, NEMA type B, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, rated for 180oC (356oF). The stator shall be press fitted into the stator housing. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is unacceptable. The rotor bars and short circuit rings shall be made of cast aluminum.

The motor shall be designed for continuous duty. The maximum continuous temperature of the pumped liquid shall be 40°C (104°F), and intermittently up to 50oC (122oF). The motor shall be capable of handling up to 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be 1.3. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase-to-phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C. The motor shall meet the requirements of NEMA MG1 Part 30 and 31 for operation on PWM type Variable Frequency Drives.

- E. Closed Loop Cooling System: The factory installed closed loop cooling system shall be adequately designed to allow the motor to run continuously under full load while in an unsubmerged or minimally submerged condition. A cooling jacket shall surround the stator housing, and an environmentally safe non-toxic propylene glycol solution shall be circulated through the jacket by a circulating impeller attached to the main motor shaft. The coolant shall be pumped through an integrated heat exchanger in the base of the motor whenever the motor is running, allowing excess heat to be transferred to the process liquid. Cooling systems that circulate the pumped medium through the cooling jacket, or those that use a toxic cooling liquid shall not be acceptable. The use of external heat exchangers, fans, or the supply of supplemental cooling liquid shall not be required.
- F. Thermal Protection: Each phase of the motor shall contain a normally closed bi-metallic temperature monitor switch imbedded in the motor windings. These thermal switches shall be connected in series and set to open at 140°C +/- 5°C (284°F). They shall be connected to the control panel to provide a high stator temperature shutdown signal, and are used in conjunction with external motor overload protection.
- G. Mechanical Seal: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non-proprietary design, and shall be manufactured by a major independent manufacturer specializing in the design and manufacture of mechanical seals. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty silicon-carbide seal ring and one rotating industrial duty silicon-carbide seal ring. The stationary ring of the primary seal shall be installed in a seal holding plate of gray cast iron EN-GJL-250 (ASTM A-48, Class 35B). The seal holding plate shall be equipped with swirl disruption ribs to prevent abrasive material from prematurely wearing the seal plate. The upper, secondary seal unit, located between the lubricant chamber and motor housing, shall contain one stationary industrial duty silicon-carbide seal ring, and one rotating one rotating industrial duty silicon-carbide seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall not require routine maintenance, or adjustment, and shall not be dependent on the direction of rotation for proper sealing. Each pump shall be provided with a lubricant chamber for the shaft sealing system which shall provide superior heat transfer and maximum seal cooling. The lubricant chamber shall be designed to prevent overfilling, and to provide lubricant expansion capacity. The drain and inspection plug shall have a positive anti-leak seal, and shall be easily accessible from the outside of the pump. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. Lubricant in the chamber shall be environmentally safe non-toxic material. Tungsten Carbide seals will not be accepted.
- H. Mechanical Seal Protection System: The primary mechanical seal shall be protected from interference by particles in the wastewater, including fibrous materials, by an

active Seal Protection System integrated into the impeller. The back side of the impeller shall be equipped with a sinusoidal cutting ring, forming a close clearance cutting system with the lower submersible motor housing or seal plate. This sinusoidal cutting ring shall spin with the pump impeller providing a minimum of 75 shearing actions per pump revolution. Large particles or fibrous material which attempt to lodge behind the impeller, or wrap around the mechanical seal shall be effectively sheared by the active cutting system into particles small enough to prevent interference with the mechanical seal. The Seal Protection System shall operate whenever the pump operates, and shall not require adjustment or maintenance in order to function. Submersible pump designs that do not incorporate an active cutting system to protect the primary mechanical seal shall not be considered acceptable for wastewater service.

- I. Seal Failure Warning System: The integrity of the mechanical seal system shall be continuously monitored during pump operation and standby time. An electrical probe shall be provided in a sensing chamber positioned above the mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be air filled, and shall have a drain / inspection plug with a positive anti-leak seal which is easily accessible from the outside of the pump. A solid-state relay mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe, continuously monitoring the conductivity of the liquid in the sensing chamber. If sufficient water enters the sensing chamber through the mechanical seal system, the probe shall sense the increase in conductivity and signal the solid state relay in the control panel. Systems utilizing float switches or any other monitoring devices located in the stator housing rather than in a sensing chamber between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable
- J. Pump Shaft: The pump shaft and motor shaft shall be an integral, one piece unit adequately designed to meet the maximum torque required at any normal start-up condition or operating point in the system. The shaft shall have a full shutoff head design safety factor of 1.7, and the maximum shaft deflection shall not exceed .05 mm (.002 inch) at the lower seal during normal pump operation. Each shaft shall be stainless steel 1.4021 (AISI 420) material, and shall have a polished finish with accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel, chrome plated, or multi piece welded shafts shall not be considered adequate or equal.
- K. Bearings: Each pump shaft shall rotate on high quality permanently lubricated, greased bearings. The upper bearing shall be a deep grooved ball bearing and the lower bearings shall be a heavy-duty double row angular contact ball bearing. Bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. L-10 bearing life shall be a minimum of 100,000 hours at flows ranging from ½ of BEP flow to 1½ times BEP flow (BEP is best efficiency point). The bearings shall be manufactured by a major internationally known manufacturer of high quality bearings, and shall be stamped

with the manufacturer's name and size designation on the race. Generic or unbranded bearings from other than major bearing manufacturers shall not be considered acceptable.

- L. Power Cable: The power cables shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.
- M. Cable Entry/Junction Chamber: The cable entry design shall not require a specific torque to insure a watertight seal. The cable entry shall consist of cylindrical elastomer grommets, flanked by stainless steel washers. A cable cap incorporating a strain relief and bend radius limiter shall mount to the cable entry boss, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry. Cable entry designs which utilize potting compounds to provide a watertight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal. The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a compression or post type terminal board, allowing for easy disconnection and maintenance.

2.03 Wet Well Guide Rail Base Assembly

- A. The discharge base & straight through 4-inch discharge shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pumps shall connect to the guide rail base automatically and firmly, guided by one 2-inch schedule 40 316 stainless steel guide rails extending from the straight through discharge to the top of the station. Systems using guide cable in lieu of rigid guide bars or pipes shall not be considered acceptable. The sliding guide bracket shall be a separate part of the pumping unit, capable of being attached to standard 4 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non-standard flange dimensions shall not be considered acceptable.
- B. A field replaceable Nitrile (Buna-N) rubber profile gasket or O-ring shall accomplish positive sealing of the pump flange/guide rail bracket to the straight through discharge pipe. Base assemblies that rely solely on metal-to-metal contact between the pump flange and straight through discharge pipe as a means of sealing are inherently leak prone, and shall not be considered equal. No portion of the pump shall bear directly on the floor of the sump..

2.06 CONTROLS

- A. Pumping System Control Panel shall be provided under Division 13 – Instrumentation and Controls.
- B. Pump manufacturer shall provide and deliver stator winding thermal sensor and moisture detection relays for each pump to the Contractor for incorporation into the motor controllers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturer's instructions.
- B. Install pumping units and pump base in the bottom wet well structure and provide supports as required.
- C. After alignment is correct, grout as specified in Section 03300.
 - 1. Fill entire base and leave no gaps or voids.
 - 2. Do not embed leveling nuts in grout.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Provide services of factory trained service engineer with a minimum of five (5) years' experience to assist in location of anchor bolts; setting, leveling, field erection, etc.; and coordination of piping, electrical and miscellaneous utility connections. Provide in accordance with Section 01665.
- B. Provide services of manufacturer's representative as specified in Section 01665.
- C. Provide operation and maintenance training as specified in Section 01665.

3.03 FIELD TESTING

- A. Refer to Drawing C-2.4 to coordinate bypass pumping system with installed new pumps during field testing and startup.
- B. Certified Performance Tests: With the suction and discharge piping configured for the final operating conditions, conduct performance tests on each pump to determine pump shutoff head and full speed operating head and flow.
- C. The Contractor shall conduct a running pump test for a minimum of 4 hours, in the presence of the Engineer. The test shall indicate that the pumps conform to the head and capacities specified.

- D. Field vibration testing shall be performed by the manufacturer's factory representative in accordance with HI 11.6.
- E. The Contractor shall provide both factory and field acceptance testing of the RVNR Starters, I&C pumps control and alarm panels as specified in Division 13 and Division 16.
- F. A 14-day operating period of the pumps will be required before acceptance. If pump performance does not meet the Specifications and shop drawing submittals, the Contractor shall take corrective measures or the pumps shall be removed and replaced with pumps that satisfy the conditions specified at no additional cost to the Owner. The decision of the Engineer shall be final.
- G. The manufacturer shall furnish the services in the presence of the Engineer, of a qualified factory representative for a minimum of 8 hours to confirm the completed pump installation to be satisfactory. Compensation for such services shall be paid for by the Contractor.
- H. The pump supplier, after successfully completing the pumps and I&C panels field testing, shall issue a letter of certification on the equipment's installation and operation with regards to its acceptability for its warranty.
- I. Pump tests include all I & C testing. Test will include the testing of all associated controls.

3.04 SPECIAL TOOLS AND SPARE PARTS

- A. Furnish one set of all special tools required for the proper servicing of all equipment supplied under these Specifications, packed in a suitable steel tool chest with a lock. Special tools shall include any tools not available in ordinary hardware stores.
- B. Furnish the manufacturer's standard set of spare parts including at least the following:
 - Two (2) Repair Kits,
 - Upper and lower mechanical seals,
 - bearings,
 - O-ring kit, and
 - Cable seals.
 - One (1) Impeller Kit
 - One (1) wear plate

END OF SECTION

SECTION 11312

PACKAGE PUMP STATION

PART 1 GENERAL

1.01 SUMMARY

- A. This Specification is for the Wellesley Circle Pump Station.
- B. Furnish, install, test and place into satisfactory operating condition wet pit submersible sewage pumps, guide rails, guide rails slide, straight through base connections, prefabricated above grade valve pit enclosure.

1.02 RELATED WORK

- A. Division 1 – General Requirements
 - 1. Section 01665 – Services of Manufacturer’s Representatives
 - 2. Section 01710 – Startup
 - 3. Section 01730 – Operations and Maintenance Manual
 - 4. Section 01750 – Spare Parts
 - 5. Section 01751 – Lubricants
- B. Division 9 - Finishes
- C. Division 13 – Instrumentation and Controls
- D. Division 15 - Mechanical
- E. Division 16 - Electrical Work

1.03 DESIGN REQUIREMENTS

- A. The Work shall include all accessories, and appurtenances necessary to make a complete system. Work shall conform to requirements for installation, materials, and equipment approvals of state, local, Underwriters' Laboratories, Inc., or other applicable codes, whether or not called for in detail on the drawings or in these specifications.
- B. All pump openings, internal passages, and internal recirculation ports shall be large enough to permit the passage of a sphere 4" in diameter, and any trash or stringy material which may pass through the average house collection system. Screens or any internal devices that create a maintenance nuisance or interfere with priming and performance of the pump shall not be permitted.
- C. Pumps and motors shall be capable of operating in a continuous submerged condition in vertical position in a wet pit installation. Pumps shall be mounted on a double 2-inch guide rail with slide bracket for easy removal without having to enter the wet well. A 3-inch discharge shall be permanently connected to the 2-inch discharge pipe via an eccentric reducer located inside the wet well.

D. Certified dimensional drawings indicating size and locations of the priming recirculation port or ports shall be submitted to the Engineer prior to shipment.

E. New pumps shall be capable of performing under the following operating conditions:

Wellesley Circle Pump Station

2-Pumps (Submersible)

Pumps	Capacity (gpm)	TDH (ft)	Maximum Motor Horsepower	Maximum Speed (RPM)	Min Efficiency	Shut-off Head (ft)	Pump Runout
Single Pump Operation	125	19	2 ¹	1,750	43%	26.5	245 gpm @ 7 ft

1: Motors rated 230 volts, 1 phase,

2: Motor shall not overload over the entire length of the curve.

3: Information based on Gorman-Rupp SFV3A submersible pump

F. The pumping units shall be designed to pump raw domestic sewage and discharge into a force main.

1.04 QUALITY ASSURANCE

A. Pumps shall be the product of a single manufacturer with a minimum of ten years experience with equipment of the size and type specified operating in a similar arrangement.

B. Equipment and accessories shall be the standard cataloged products of the manufacturer except as otherwise specified or indicated.

C. Pump manufacturer to provide the submersible pump, pump base, guide rail slide brackets, upper guide brackets, straight through base connection, rails and appurtenances regardless of the manufacturer, as a complete and integrated package to insure proper coordination and compatibility of equipment.

1.05 SHOP TESTS

A. Motor Tests

1. Motor factory shop tests shall be in accordance with IEEE Standard 112, Appendix A, plus the factory’s standard routine tests for the specified motor horsepower.

B. Pump Tests

1. Certified Performance Tests: Conduct performance tests per HI Grade 1U on each pump and motor unit to determine head, capacity, speed, and brake horsepower at not less than six points on the operating curve including rating point and best efficiency point. Test data shall be sufficiently comprehensive to produce guaranteed performance curves showing head versus capacity, efficiency, and brake horsepower for the rated speed. Engineer shall be supplied with the complete test procedure in advance of the testing. Test shall be witnessed and certified by a professional Engineer.
2. Hydrostatic Pressure Tests: Conduct hydrostatic pressure tests on each pump.
3. Demonstrate that all equipment is capable of continuous operation in satisfactory manner without mechanical or electrical defects or operational difficulties under suction and discharge conditions.
4. Repeat tests, if necessary, until results are obtained satisfactory to the Engineer.
5. Correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.
6. Conduct all tests in accordance with the latest standards of the Hydraulic Institute.
7. If the specified tests indicate the pump or motor will not meet the specifications, the Engineer has the right to require complete tests for all pumps and motors at no additional cost to the Owner.

1.06 REFERENCES

- A. ASTM A48 - Standard Specification for Gray Iron Castings.
- B. ASTM A276 - Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
- C. AFBMA
- D. Hydraulic Institute Standards.
- E. National Electrical Manufacturer's Association.

1.07 SUBMITTALS

- A. Submit to the Engineer for approval as provided in Section 01300, shop drawings showing details of construction and installation of all equipment furnished under this Section. The following shall be included:
 1. Shop drawings and materials of construction and performance of electric motors, pumps, controls, pipes, valves and fittings, equipment, conduit, wiring, wiring

devices, transformer and access manhole, rails and bracket.

2. Manufacturer's rating curves showing pump characteristics of pressure, capacity, brake horsepower, and efficiency. This information shall be prepared specifically for the pump proposed. Catalog sheet showing a family of curves will not be acceptable.
 3. Literature and drawings describing the equipment in sufficient detail, including materials of construction and parts list, to indicate full conformance with the detail specifications.
 4. Complete parts list for equipment furnished.
 5. Motor data such as HP, Volts, RPM, FLC, Efficiency, and p.f. as described herein.
 6. Complete wiring diagrams and schematics of all controllers, control panels, control devices, and operators furnished under this Section.
 6. Complete wiring diagrams and schematics of all power and control systems.
 7. Drawings depicting the mechanical seal configuration.
 8. Floor plans, sections and elevations showing a complete layout to scale of all equipment, piping, electrical conduits and wall sleeve installation locations and methods to provide watertight seals.
 9. Motor wiring diagrams for power and high temperature switches.
 10. Services of manufacturer's representative and warranties.
 11. Drawings and calculations indicating pipe support material, locations, and engineering data of support scheme.
- C. In the event that it is impossible to conform to certain details of the specifications due to different manufacturing techniques, describe completely all non-conforming aspects for review and approval by the Engineer.
- C. Submit under provisions of Section 01300.
- D. Pump and Motor Characteristics and Performance Data:
1. Provide guaranteed certified performance curves based on actual shop tests of mechanically duplicate pumping units, showing they meet specified requirements for capacity, head, horsepower, efficiency, and NPSH. For units of same size and type, provide curves for a single unit.

2. Catalog performance curves at required speed showing maximum and minimum impeller diameters available.
- E. Manufacturer's written warranty.
- F. Shop Test Results: One (1) electronic copy of pump performance test data, pump performance curves, hydrostatic test results and motor test results.
- G. Field Inspection Reports: Submit under provisions of Section 01700.

1.08 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Provide operation and maintenance instructions as specified in Section 01730. Note, both "Paper" and "Electronic" manuals are required.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of equipment.
- 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.
- D. Inspect and inventory items upon delivery to site and provide Engineer with inventory list.
- E. Store and safeguard equipment, material, and spare parts in accordance with manufacturer's instructions and deliver to Owner after completion of the work.

1.10 WARRANTY

- A. The manufacturer shall guarantee the pumps free from defects in workmanship and materials for a period of 5 years.

PART 2 PRODUCTS

2.01 ACCEPTABLE PUMP MANUFACTURERS

- A. Gorman Rupp
- B. Additional pump manufacturers may be considered acceptable alternatives. Documentation shall be submitted with Bids for review and approval by the Engineer

that demonstrates compliance with project specifications, including dimensions, process mechanical, electrical, instrumentation and control.

- C. Should equipment which differs from the first named in this Section 2.01.A be offered and determined to be the equal of that specified, such equipment shall be acceptable only on the basis that any revision in the design and/or construction of the structure, piping, appurtenant equipment, electrical work, etc. required to accommodate such a substitution shall be made at no additional cost to the Owner and be as approved by the Engineer.

2.02 PUMP CONSTRUCTION

- A. Major pump components shall be of gray cast iron ASTM A-48 Class 30 with smooth surfaces devoid of porosity or other irregularities. Pump shall be provided with a 125# Flange. All exposed fasteners shall be 303/304 stainless steel construction. All external surfaces coming into contact with wastewater shall be protected by water-based epoxy primer and a waterborne enamel topcoat with a minimum 8 mil thickness. All exposed fasteners and lock washers shall be of 300 series stainless steel.
- B. Impeller: The impeller shall be a multi-vane vortex type with integral stagger-step winglets on each vane. The winglet shall form a stagger-stepped L-shaped cross section at the face of the vane for improved hydrodynamic efficiency. Impeller shall be of ductile iron and precision balanced. Balancing shall not deform or weaken the impeller. The impeller shall be recessed into the pump casing and shall not require flow of liquid through the impeller. The impeller and seal housing shall incorporate auxiliary vanes to hydraulically reduce pressure on the primary seal and force fibrous materials and solids away from the close axial clearance on the backside of the impeller. The impeller shall be driven by means of a key slotted into the shaft. Impeller fasteners shall be non corroding. No impeller clearance adjustment or wear rings shall be required.
- C. Seals:
 - 1. Two separate mechanical seals shall be provided, arranged in tandem. The upper seal shall have a carbon rotating face and ni-resist stationary face. The lower seal shall incorporate silicon carbide on both the rotating and stationary faces. Cage and springs shall be of stainless steel and elastomers of Viton or Buna-N.
 - 2. The rotating seal faces shall be lubricated from an oil filled reservoir between pump and motor; the oil serving as both lubricating and a cooling media. The reservoir shall have two oil fill and drain plugs to insure accuracy when measuring lubricant level and for ease of maintenance.
 - 3. Seal shall require no special maintenance or routine adjustment; however, shall be easily inspected or replaced. No seal damage shall result from operating the pump for short periods of time without liquid.

4. A seal failure electric probe sensor shall be installed in the seal chamber. The sensor shall be capable of sensing leakage into the seal chamber and the sensitivity level shall be set in the control pane.

D. Premium Efficiency Motor shall be provided with the following:

1. The motor and pump must be connected to form an integral unit. Motor shall be a squirrel-cage, induction type in an air-filled water tight enclosure, oil-filled motors shall not be acceptable. The motor shall conform to NEMA design standards, and incorporate Class H insulation materials to withstand a continuous operating temperature of 180°C (356°F). The pump and motor shall be capable of handling liquids with a maximum temperature of 40°C (104°F 60 Hz at 1750 rpm)
2. Motor shall be capable of sustaining a maximum of 10 starts per hour and shall be inverter duty rated in accordance with NEMA MG1. The motor shall not require a cooling jacket or any other means of auxiliary cooling during normal continuous operation
3. Motor housing shall be of cast iron. The stator shall consist of copper windings with copper connectors applied to high grade electrical steel laminations. The stator shall be held securely in place by a heat shrink fit into the motor housing. Any other means of securing the stator which would require penetration of the motor housing shall not be considered acceptable.
4. Combined rotor and shaft assembly shall be dynamically balanced for vibration free operation. Rotor end bars and short circuit rings shall be of aluminum. The pump shaft shall be of 17-4 PH series stainless steel. The shaft shall be machined with shoulders or snap ring grooves for positive placement of bearings.
5. The upper and lower bearing shall be of heavy-duty design, capable of supporting the shaft and rotor while under maximum radial and thrust loads. The bearings shall be permanently grease lubricated and sealed at the time of installation. The minimum B-10 bearing life shall be 50,000 hours over the normal operating range of the curve.
6. d. The pump and electrical cables shall be capable of continuous submergence without loss of waterproof integrity to a depth of 65 feet
7. 32-feet of 10 AWG power cable and 14 AWG control cables.
8. The motor shall be protected from thermal damage by a group of three separate thermostatic switches embedded into the stator windings, one per stator phase. Each switch shall open independently and terminate motor operation if temperature of the protected winding reaches the high temperature set point of 160°C (320°F) and shall automatically reset upon cooling of the winding. The thermal sensing device shall be connected to the pump control panel by the contractor.
9. The pump shall utilize a single probe to monitor both the motor and seal chambers for moisture intrusion. The detection of moisture in either chamber shall send a signal to the control panel which shall be used to notify the user of the need for an inspection

2.03 Wet Well Guide Rail Base Assembly

- A. Each pump shall be furnished with a submersible discharge connection system to permit removal and installation of the pump without the necessity of an operator entering the wet well. The design must insure an automatic and firm connection of the pump to the discharge piping when lowered into place.
- B. A gray iron or fabricated steel base plate with integral guide rail pilots shall be provided along with all hardware and anchor bolts required for permanent installation to the wet well floor. The base plate shall be designed with an integral 90⁰ elbow, or adapt to a commercially available elbow for connection to the vertical discharge piping utilizing standard ANSI 125 lbs. flanges. The base plate shall be coated with an epoxy coating for corrosion resistance. The manufacturer shall provide all necessary drawings to insure proper installation and alignment of baseplate within the sump.
- C. Each pump shall be provided with a replaceable ductile iron slide rail guide shoe attached to pump discharge flange. A replaceable neoprene seal shall be provided as an integral part of the guide shoe to form a seal with the base plate connection and eliminate the possibility of leakage and erosive wear during operation. The seal shall contact mating faces in a static position and shall have adequate flexibility to flex under pumping pressure to increase seal efficiency. Metal-to-metal contact at the discharge connection shall not be acceptable.
- D. The contractor shall provide two lengths of 2", schedule 40 stainless steel guide rail pipe for each pump.
- E. Upper guide rail pilots, and a lifting cable shall be furnished for each pump. Bottom pilots shall be an integral part of the baseplate for ease of installation and proper alignment.
- F. The guide shoe shall direct the pump down two vertical guide rails and onto the discharge connection in a simple lineal movement. The buildup of sludge and grease on guide rails shall not present problems during the lifting operation. The guide shoe shall be designed with integral hooks at the top to transmit full weight of the pump to the base plate flange. No portion of the pump shall be supported directly on the bottom of the wet well, guide rails, or lifting cable.
- G. Lifting cable shall consist of a 316 stainless steel braided wire cable attached to the pump lifting bail. A crimped ball end shall be provided at the upper end of this cable for attaching to the wet well access frame.
- H. All bolts, machine screws, nuts, washers, and lock washers for complete assembly of access cover, guide rails, and discharge elbow shall be stainless steel.

2.04 ELECTRICAL CONTROL COMPONENTS

- A. The pump station control panel will be tested as an integral unit by the pump station manufacturer.
- B. Panel Enclosure
 - 1. The electrical control equipment shall be mounted within a 36"x30"x14" Nema 1 stainless steel, dead front type control enclosure. The enclosure door shall be hinged and sealed with a neoprene gasket. It shall include a removable plated steel back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Operator controls shall be mounted on the enclosure door. The enclosure shall be mounted within the fiberglass valve enclosure. The control panel shall be equipped with vapor emission type corrosion inhibitors.
 - 2. All control components shall be securely fastened to a removable back panel with screws and lock washers. Switches, indicators and instruments shall be mounted through the control panel door. All control devices and instruments shall be secured to the sub-plate with machine screws and lockwashers. Mounting holes shall be drilled and tapped; Self tapping screws shall not be used to mount any components. All connections from the back panel to door mounted or remote devices shall be made through terminal blocks. All control devices shall be clearly labeled to indicate function.
 - 3. A main terminal block and ground bar shall be furnished for field connection of the electrical supply. The connections shall be designed to accept copper conductors of sufficient size to serve the pump station loads. The main terminal block shall be mounted to allow incoming wire bending space in accordance with Article 373 of the National Electrical Code (NEC).
- C. Pump station components and controls shall conform to third party safety certification. The station shall bear a UL label listed for "Packaged Pumping System". The panel shall bear a serialized UL label listed for "Enclosed Industrial Control Panels". The pump station components, panel enclosure, and all components mounted on the sub panel or control cover shall conform to UL descriptions and procedures.
- D. The control panel shall be equipped with a modular surge arrestor to minimize damage to the pump motors and control from transient voltage surges. The suppressor shall utilize thermally protected by heavy duty zinc oxide varistors encapsulated in a nonconductive housing. Mechanical indicators shall be provided on each phase to indicate protection has been lost. The suppressor shall have a short circuit current rating of 200,000 Amps and a Maximum Discharge current rating [I_{max}] of 40,000 Amperes. Nominal discharge current [I_n] is 20,000 Amperes. Surge arrestor according to UL 1449 3rd Edition, Type 2 component assembly.
- E. Motor Branch Components
 - 1. A properly sized heavy duty air circuit breaker shall be furnished for each pump motor, see electrical drawings for requirements. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering.
 - 2. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operator handles for the mechanisms shall be located on the door, with

interlocks which permit the door to be opened only when circuit breakers are in the "OFF" position. An additional mechanism(s) shall be provided on the circuit breaker permitting the breaker to be operated and/or locked with the control panel door in the open position.

3. Motor Starters

- a. A reduced voltage, solid state motor starter shall be furnished for each pump motor. The starter construction shall be modular with separately replaceable power and control sections. The power section shall consist of six back-to-back SCR's rated 208 to 480 volts, 50/60 hertz. The SCR's shall have a minimum repetitive peak inverse voltage rating of 1400 volts at 480 volts. The enclosed operating temperature range shall be 0 to 40 degrees C at altitudes up to 2000 meters without derating.
- b. Starting Modes: Starting modes shall be selectable soft start, current limit, or full voltage. Soft starting the pump shall include an adjustable initial torque value of 0 to 90 %. The acceleration ramp shall be adjustable from 0 to 30 seconds. The starter shall include a selectable kick start providing a current pulse at start. Kick start level shall be adjustable from 0 to 90% of locked rotor torque. Kick start time shall be adjustable from 0 to 2 seconds. Current limit mode shall provide means for limiting the starting current to a programmable value between 50 and 600% of full load current. Full voltage start shall provide across the line starting with a ramp time of less than 0.25 seconds.
- c. Pump Control Mode: Ramp time will be dependent on pump torque requirements. The starter shall provide smooth acceleration and deceleration, which approximates the flow rate of a centrifugal pump. The starter's microcomputer shall analyze motor variables and generate control commands, which will minimize surges in the system. Pump stop time shall be adjustable from 0 to 120 seconds. Pump control provides reduced hydraulic shock.
- d. Bypass: When the start ramp time is complete, the starter shall energize an integral bypass contactor. When in the bypass mode, the bypass contactor shall carry the motor load to minimize internal heating in the electrical enclosure.
- e. Protection: The starter shall include protective features: Communication fault, control temperature, excess starts/hour, stall, jam, line fault, open gate, overload, overvoltage, phase reversal, power loss, underload, undervoltage, shorted SCR, open bypass and voltage unbalance.
 - 1) An integral electronic overload relay equipped with thermal memory shall be included and shall utilize three phase current sensing. Adjustments shall include trip current, service factor and 10, 15, 20 or 30 trip class.
 - 2) Jam trip shall be adjustable 0-1,000% of the nominal motor current with a delay time adjustment of 0-99 seconds.
 - 3) Stall protection senses that the motor is not up-to-speed at end of ramp and will shut down after a user-selected delay time has elapsed. Stall delay shall be adjustable from 0-10 seconds.

- 4) Fault diagnostics shall be displayed on the starter and shall include temperature fault, line fault, open gate and power loss.
 - f. Display: The starter shall include a keypad and display on the front of the control module. The display is equipped with a built-in four line, 16 character backlit LCD. The LCD displays metering, faults and parameter settings in English. Faults will display in English and fault code. A fault buffer will store the last five faults. Metering capabilities shall include: Three phase current, three phase voltage, power factor, motor thermal usage, wattmeter, kilowatt hours, and elapsed time meter. Digital parameter adjustments shall be made using the keypad.
 - g. Door Mounted Display: Each starter shall be furnished with a display and keypad mounted to the door of the control panel. The door mounted display will duplicate the functions of the starter display and allow the operator to monitor or change parameters without opening the control panel door.
- F. All motor branch and power circuit components shall be of highest industrial quality. The short circuit current rating of all power circuit devices shall be a tested combination or evaluated per the National Electrical Code Article 409. The lowest rated power circuit component shall be the overall control panel short circuit rating and shall not be less than the fault current available. The minimum control panel rating shall not be less than 10 kA, rms symmetrical. Control assemblies operating at 120 volts nominal or less may be provided with transformers which limit the fault current and may be rated less than the minimum required short circuit rating
- G. The pump control panel shall be equipped to terminate pump operation due to high motor winding temperature or moisture in the motor housing or seal cavity, utilizing contacts in the pump motor housing and seal cavity. If a moisture or thermal event should occur, the motor starter will drop out and a visible indicator on the door shall indicate the pump motor has been shut down. If shutdown is due to high motor temperature, motor power will automatically be restored when the temperature returns to normal range. If the shutdown occurs due to moisture, a manual reset will be required before motor power is restored. Dry contacts, wired to terminal blocks, shall be furnished for each pump for thermal/moisture shutdown.
- H. The control circuit shall be protected by a normal duty thermal magnetic air circuit breaker which shall be connected in such a manner as to allow control power to be disconnected from all control circuits.
- I. Additional Control Components
1. Pump mode selector switches shall be connected to permit manual start and manual stop for each pump individually, and to select automatic operation of each pump under control of the liquid level control system. Manual operation shall override the liquid level control system. Selector switches shall be heavy duty, oil tight design, with contacts rated NEMA A300 minimum.
 2. Pump alternation shall be integral to the liquid level controller. Provisions for automatic alternation or manual selection shall also be integral to the liquid level controller.

3. Control panel shall be equipped with one oil tight pilot light for each pump motor. Light shall be wired in parallel with the related pump motor starter to indicate that the motor is on or should be running.
4. Six digit elapsed time meter shall be displayed on the Integrix™ Standard operator interface to indicate total running time of each pump in "hours" and "tenths of hours". Pump runtime shall be adjustable and password protected.
5. A switch shall be provided to permit the station operator to select automatic alternation of the pumps, to select pump number one to be the lead pump for each pumping cycle or to select pump number two to be the lead pump for each pumping cycle. Selector switch shall be oil tight design, with contacts rated NEMA A300 minimum.
6. A duplex ground fault indicating utility receptacle providing 115 VAC, 60 Hertz, single phase current, shall be mounted on the door panel of the control enclosure. Receptacle circuit shall be protected by a 15 ampere thermal magnetic circuit breaker.
7. The control panel shall be equipped to monitor the incoming power and shut down the pump motors when required to protect the motor(s) from damage caused by phase reversal, phase loss, voltage unbalance, high voltage, and low voltage. An adjustable time delay shall be provided to minimize nuisance trips. The motor(s) shall automatically restart, following an adjustable time delay, when power conditions return to normal.
8. The control panel shall be equipped to monitor the incoming power and shut down the pump when required to protect the motor(s) from damage caused by voltage less than 83% of nominal. The motor(s) shall automatically restart when power conditions return to normal.
9. The control panel shall be equipped with a panel heater to minimize the effects of humidity and condensation. The heater shall include a thermostat.

J. Wiring

1. The control panel, as furnished by the manufacturer, shall be completely wired. The contractor shall field connect the power feeder lines to the main terminal block, final connections to the remote alarm devices, and the connections between the pump and the pump motor control. All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electric Code (NEC).
2. All user serviceable wiring shall be type MTW or THW, 600 volts.
3. Control circuit wiring inside the panel, with the exception of internal wiring of individual components, shall be of 16 gauge minimum, type MTW or THW, 600 volts. Power wiring shall be 14 gauge minimum.
4. Motor branch and other power conductors shall not be loaded above the temperature rating of the connected termination. Wires shall be clearly numbered at each end in accordance with the electrical diagrams. All wires on the sub plate shall be bundled and tied.
5. Wires connected to components mounted on the enclosure door shall be bundled and tied in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall be provided to allow the door to swing to its full open position without undue stress

or abrasion on the wire or insulation. Bundles shall be held in place on each side of the hinge by mechanical fastening devices.

K. Conduit

1. All conduit and fittings shall be UL listed.
2. Liquid tight flexible metal conduit shall be constructed of smooth, flexible galvanized steel core with smooth abrasion resistant, liquid tight, polyvinyl chloride cover.
3. Conduit shall be sized and supported in accordance with the National Electrical Code.

L. Grounding

1. The pump control manufacturer shall provide a common ground bar mounted on the enclosure back plate. The mounting surface of the ground bar shall have any paint removed before making final connections.
2. The contractor shall make the field connections to the main ground lug and each pump motor in accordance with the National Electric Code.

M. Identification

1. A permanent corrosion resistant name plate(s) shall be attached to the control and include the following information:
 - a. Equipment serial number
 - b. Control panel short circuit rating
 - c. Supply voltage, phase and frequency
 - d. Current rating of the minimum main conductor
 - e. Electrical wiring diagram number
 - f. Motor horsepower and full load current
 - g. Motor overload heater element
 - h. Motor circuit breaker trip current rating
 - i. Name and location of equipment manufacturer
2. Control components shall be permanently marked using the same identification shown on the electrical diagram. Identification label shall be mounted adjacent to the device.
3. Switches, indicators, and instruments shall be plainly marked to indicate function, position, etc. Marking shall be mounted adjacent to and above the device.

2.05 STATION ENCLOSURE

- A. The station enclosure shall contain and enclose all valves, and associated controls and shall be constructed to enhance serviceability by incorporating the following design characteristics:
1. Two hinged access panels per side of station shall be provided. Panels shall be sized and placed to permit routine maintenance operations through the panel openings of the enclosure. For these purposes, routine maintenance shall include frequently performed adjustments and inspections of the electrical components, controls and valves.

2. The access panels shall be provided with a hinge and latch. Hinge shall be the continuous type. Latch shall engage the enclosure at not less than three places, and shall be protected by a keyed lock.
 3. One enclosure side shall contain a screened vent to maximize air flow for enclosure ventilation.
 4. Station enclosure, less base, must be removable or able to be disassembled following the removal of reusable hardware.
 5. Removal or disassembly of the enclosure shall be accomplished by not more than two maintenance personnel without the use of lifting equipment.
- B. The station enclosure shall be manufactured of molded reinforced orthophthalic polyester resins with a minimum of 30% fiberglass, and a maximum of 70% resin. Resin fillers or extenders shall not be used.
- C. Glass fibers shall have a minimum average length of 1 1/4 inches. Major design considerations shall be given to structural stability, corrosion resistance, and watertight properties. The polyester laminates shall provide a balance of mechanical, chemical, and electrical properties to insure long life. They must be impervious to micro-organisms, mildew, mold, fungus, corrosive liquids, and gases which can reasonably be expected to be present in the environment surrounding the wet well.
- D. All interior surfaces of the housing shall be coated with a polyester resin-rich finish. It shall provide:
1. Maintenance-free service
 2. Abrasion resistance
 3. Protection from sewage, greases, oils, gasoline, and other common chemicals
 4. The outside of the enclosure shall be coated with a suitable pigmented resin, compounded to insure long maintenance-free life.
- E. An exhaust blower shall be mounted on the side of the enclosure. Blower capacity shall be sufficient to change station air a minimum of once every two minutes. Blower motor shall be operated automatically and shall be turned on at approximately 70 degrees F and shall be turn off at 55 degrees F. Blower motor and control circuit shall be protected by a thermal-magnetic air circuit breaker to provide overcurrent and overload protection. Blower exhaust outlet shall be designed to prevent the entrance of rain, snow, rocks, and foreign material
- F. .Pump station shall be provided with a 1300/1500 watt, 115 volt electric heater with cord, thermostat and grounding plug.
- G. The pump station shall be furnished with 1" thick spray foam insulation, which shall be applied to the roof, doors, and corner panels.

- H. The station enclosure shall include limit switches with defeater switch alarm circuit and time delay, mounted and wired in the station enclosure to indicate that there has been a door left open or unauthorized entry to the station. There shall be an adjustable time period for the operator to disable alarm with an unmarked pushbutton located inside the station. The notification shall be activated when a station door is opened. Includes dry contacts pre-wired to a terminal strip for remote monitoring.
- I. The pump station shall be equipped with a glycerin-filled pressure gauge to monitor discharge pressures. Gauge shall be a minimum of 4 inches in diameter, and shall be graduated in feet water column. Rated accuracy shall be 1 percent of full scale reading. Pressure gauge shall be graduated 0 to 140 feet water column minimum. Gauge kit shall be mounted and complete with all hoses and stainless steel fittings and shall include a shutoff valve installed in each connection to discharge piping and a three way valve to monitor either pump.
- J. The pump station shall be provided with a portable hoist with winch assembly sized to lift the pump as provided. Hoist socket and stainless steel connecting hardware shall be shipped loose.
- K. Station manufacturer will supply one 115 volt AC alarm light fixture with vapor-tight red globe, guard, conduit box, and mounting base. The design must prevent rain water from collecting in the gasketed area of the fixture, between the base and globe. The alarm light shall be mounted on the station enclosure.

2.06 VALVES AND PIPING

- A. Check Valve: Each pump shall be equipped with a full flow type check valve capable of passing a 3" spherical solid. Valve shall be constructed with flanged ends and fitted with an external lever and torsional spring. Valve seat shall be constructed of stainless steel, secured to the body to ensure concentricity, sealed by an O ring, and shall be replaceable. The valve body shall be cast iron incorporating a clean out port large enough to allow removal and/or replacement of the valve clapper without removing valve or piping from the line. Valve clapper shall have a molded neoprene seating surface incorporating low pressure sealing rings. Valve hinge pin and internal hinge arm shall be stainless steel supported on each end in brass bushings. Shaft nut shall have double O rings which shall be easily replaceable without requiring access to interior of valve body. All internal hardware shall be stainless steel. Valve shall be rated at 175 PSI water working pressure, 350 PSI hydrostatic test pressure. Valves other than full flow type or valves mounted in such a manner that prevents the passage of a 3" spherical solid shall not be acceptable.
- B. Each discharge line shall be equipped with a 2 way plug valve to permit isolation of the pumps from the common discharge header. The plug valve shall be non lubricated type. Valve body shall be cast iron with flanged end connections drilled to 125 pound standard. Valve shall be furnished with a drip tight shutoff plug mounted in stainless steel or teflon over phenolic bearings, and shall have a

resilient facing bonded to the sealing surface. Valves shall have ports designed to pass 3" spherical solids.

C. Piping

1. Flanged header pipe shall be centrifugally cast, ductile iron, complying with ANSI/AWWA A21.51/C115 and class 53 thickness.
2. Flanges shall be cast iron class 125 and Comply with ANSI B16.1.
3. All pipes connected to the pump station shall be supported based on the anticipated loads.

D. Bypass Connection

1. The station header pipe shall incorporate a 2 way plug valve to permit emergency access to the pump station force main after isolation of the pumps. The plug valve shall be non lubricated, tapered type. Valve body shall be cast iron with flanged end connections drilled to 125 pound standard. Valve shall be furnished with a drip tight shutoff plug mounted in stainless steel or teflon over phenolic bearings, and shall have a resilient facing bonded to the sealing surface.
2. The header pipe shall penetrate the station side wall and terminate with a male OPW type quick connect fitting with dust cap.

E. Vacuum Break/Air Release Valves

1. The header piping shall be equipped with ball type check valves on the discharge side of each pump to allow a vacuum break to occur, as well as assist purging air from the system in the event that there is insufficient atmospheric pressure available to support the resultant water column. A ball valve and PVC line extending through the pump station base for drainage back to the wet well shall be installed in each pump discharge line.

2.07 STATION BASE.

- A. Station base shall be constructed of pre-cast, reinforced concrete bonded inside a fiberglass form covering top and sides, and shall be designed to insure adequate strength to resist deformation of the structure during shipping, lifting, or handling. The enclosure base shall function at the wet well top and incorporate a duplex access lid, sized for the installation and removal of the specified pumps, and shall be of sufficient size to permit access to the wet well. Color used shall de-emphasize the presence of dirt, grease, etc., and shall be provided with a non-skid surface.
- B. A static wet well vent shall be mounted in the station base, and be housed in the station enclosure. The station enclosure shall provide a transition area between the wet well and the vent outlet. The vent shall terminate through the station wall with a screened opening which shall be designed to prevent the entrance of rain, snow, rocks and foreign material.
- C. The station base shall incorporate a cable transition adapter for the pump cables, level controls, and associated wiring. The adapter shall provide for a vapor tight transition between the wet well and the lift station enclosure. The adapter shall incorporate cable grips for each cable and be provided with a gasket between the adapter and the station for a positive seal. Junction boxes shall not be considered for cable transition.

- D. The station base shall be furnished with elastomeric compression sealing devices for all piping penetrations to provide for a vapor tight transition between the wet well and lift station enclosure.

2.08 LIQUID LEVEL CONTROL

- A. The manufacturer of the liquid level control system must be ISO 9001:2000 revision certified, with scope of registration including design control and service after sales activities.
- B. The level control system shall start and stop the pump motors in response to changes in wet well level, as set forth herein.
- C. The level control system shall be capable of operating as either an air bubbler type level control system, submersible transducer type system, or ultrasonic transmitter type system.
- D. The level control system shall utilize alternation to select first one pump, then the second pump, then the third pump (if required), to run as lead pump for a pumping cycle. Alternation shall occur at the end of a pumping cycle, or in the event of excessive run time.
- E. The level control system shall utilize an electronic pressure switch which shall continuously monitor the wet well level, permitting the operator to read wet well level at any time. Upon operator selection of automatic operation, the electronic pressure switch shall start the motor for one pump when the liquid level in the wet well rises to the "lead pump start level". When the liquid is lowered to the "lead pump stop level", the electronic pressure switch shall stop this pump. These actions shall constitute one pumping cycle. Should the wet well level continue to rise, the electronic pressure switch shall start the second and/or third pump (if required) when the liquid reaches the "lag pump start level", or "standby pump start level" so that all pumps are operating. These levels shall be adjustable as described below.
 1. The electronic pressure switch shall include integral components to perform all pressure sensing, signal conditioning, EMI and RFI suppression, DC power supply and 120 volt outputs. Comparators shall be solid state, and shall be integrated with other components to perform as described below.
 2. The electronic pressure switch shall be capable of operating on a supply voltage of 12-24Vdc in an ambient temperature range of -10 degrees C (14 degrees F) through 55 degrees C (131 degrees F). Ingress Protection of IP56 for indoor use with closed cell neoprene blend gasket material. Evaluated by Underwriters Laboratories for Pollution Degree 2 device for U.L. and cU.L. Control range shall be 0 to 33.3 feet of water with an overall repeat accuracy of (plus/minus)

0.1 feet of water. Memory shall be non-volatile. A Battery backed real time clock shall be standard.

3. Eleven optically isolated, user defined digital inputs for pump and alarm status. Rated at 10mA at 24Vdc. Eight digital output relays (mechanical contacts), configurable for pump start/stop or alarms. Three relays rated at 12 Amp @ 28Vdc and 120Vac, five relays rated at 3 Amp @ 30Vdc and 120Vac. The electronic pressure switch shall consist of the following integral components: pressure, display, electronic comparators, digital inputs and digital output relays.
 - a. The internal pressure sensor shall be a strain gauge transducer and shall receive an input pressure from the air bubbler system. The transducer shall convert the input to a proportional electrical signal for distribution to the display and electronic comparators. The transducer output shall be filtered to prevent control response to level pulsations or surges. The transducer range shall be 0-14.5 PSI, temperature compensated from -40 degrees C (-40 degrees F) through 85 degrees C (185 degrees F), with a repeat accuracy of (plus/minus) 2.5% full scale about a fixed temperature. Transducer overpressure rating shall be 3 times full scale.
 - b. The electronic pressure switch shall incorporate a digital back lighted LCD panel display which, upon operator selection, shall indicate liquid level in the wet well, and pump status indication for up to 3 pumps. The display shall include a 128 x 64 bit resolution LCD to read out directly in feet of water, accurate to within one-tenth foot (0.1 foot), with a full scale indication of not less than 12 feet. The display shall be easily convertible to indicate English or metric units.
 - c. Level adjustments shall be electronic comparator set-points to control the levels at which the lead, lag and standby pumps start and stop. Each of the level settings shall be easily adjustable with the use of membrane type switches, and accessible to the operator without opening any cover panel on the electronic pressure switch. Controls shall be provided to permit the operator to read the selected levels on the display. Such adjustments shall not require hard wiring, the use of electronic test equipment, artificial level simulation or introduction of pressure to the electronic pressure switch.
 - d. Each digital input can be programmed as pump run, pump HOA, pump high temp, pump moisture/thermal, starter failure (FVNR, RVSS, VFD), and phase failure. Inputs are used for status and alarm indication.
 - e. Each output relay in the electronic pressure switch shall be hard contact mechanical style. Each relay input shall be optically isolated from its output and shall incorporate zero crossover switching to provide high immunity to electrical noise. Each output relay shall have an inductive load rating equivalent to one NEMA size 3 contactor. A pilot relay shall be incorporated for loads greater than a size 3 contactor.

4. The electronic pressure switch shall be equipped with alarm banners with time and date history for displaying alarm input notification. Alarm history will retain a 16 of the most recent alarm events.
5. The electronic pressure switch shall be equipped with pump start/stop and alarm input delay(s) that have an adjustable delay set points.
6. An Antiseptic function with a built in timer shall be incorporated in the electronic pressure switch to prevent the well from becoming septic.
7. The electronic pressure switch shall be capable of jumping to next available pump if current pump is out of service due to pump failure or manual selection. Circuit design in which application of power to the lag pump motor starter is contingent upon completion of the lead pump circuit shall not be acceptable.
8. The electronic pressure switch shall be equipped with a simulator system capable of performing system cycle testing functions.
9. The electronic pressure switch shall be capable of calculating and displaying pump elapse run time. The elapse run time is resettable and adjustable.
10. The electronic pressure switch shall have internal capability of providing automatic simplex, duplex, and triplex alternation, manual selection of pump sequence operation, and alternation in the event of 1-24 hours of excessive run time.
11. The electronic pressure switch shall be equipped with a security access code to prevent accidental set-up changes and provide liquid level set-point lock-out. The supervisor access code is adjustable.
12. The electronic pressure switch shall be equipped with one (1) 0-33 ft. W.C. input, one (1) scalable analog input of either 0-5Vdc, or 4-20mA, and one (1) scalable analog output of either 0-5Vdc, 0-10Vdc or 4-20mA. Output is powered by 10-24Vdc supply. Load resistance for 4-20mA output shall be 100-1000 ohms.
13. The electronic pressure switch shall include a DC power supply to convert 120Vac control power to 12 or 24Vdc power. The power supply shall be 500 mA (6W) minimum and be UL listed Class II power limited power supply.
14. The electronic pressure switch shall be equipped with an electronic comparator and mechanical output relay to alert maintenance personnel to a high liquid level in the wet well. An alarm banner, visible on the front of the controller, shall indicate that a high wet well level exists. The alarm signal shall be maintained until the wet well level has been lowered and the circuit has been manually reset. High water alarm shall be furnished with a dry contact wired to terminal blocks.

15. The electronic pressure switch shall be equipped with an electronic comparator and mechanical output relay to alert maintenance personnel to a low liquid level in the wet well. An alarm banner, visible on the front of the controller, shall indicate that a low wet well level exists. The alarm signal shall be maintained until the cause for the low wet well level has been corrected and the circuit has been manually reset. A low liquid level condition shall disable all pump motors. When the wet well rises above the low level point, all pump motors shall be automatically enabled. Low water alarm shall be furnished with a dry contact wired to terminal blocks.

F. TRANSDUCER

1. The level control system shall utilize a submersible transducer. It shall be a strain gauge transducer with a pressure sensor housed in a 316 SST or Titanium case designed to extend into the wet well. The pressure transducer shall provide a proportional signal for distribution to the display and electronic comparators of the electronic pressure switch, and remainder of the level control system. Sensor range shall be 0-12 ft. W.C. minimum with an over-pressure rating 3 times full scale. The transducer shall have output capability of 0-5Vdc or 4-20mA. The transducer's polyurethane jacketed shielded cable shall be of suitable length for proper installation into the wet well without splicing.
2. An intrinsically safe repeater shall be supplied in the control enclosure. Repeater must be recognized and listed as intrinsically safe by a nationally recognized testing laboratory. Station manufacturer shall make all connections from repeater to feeder lines and motor controls. Installing contractor shall make connections from repeater to transducer

G. HIGH WATER AND LOW WATER ALARM WITH ALARM SILENCE

1. A separate intrinsically safe float switch and relay shall be used to alert maintenance personnel to a high water level in the wet well. Should the water level rise to the "high water alarm" level, the float switch and relay shall energize a 115 volt AC circuit for an external alarm device. An electrical or mechanical indicator, visible from front of control panel, shall indicate high level condition exists. The alarm signal shall be maintained until wet well level is lowered and alarm circuit has been manually reset.
2. A separate float switch shall be used to alert maintenance personnel to a low liquid level in the wet well. An indicator, visible on the front of the control panel, shall indicate that a low wet well level exists. The alarm signal shall be maintained until the cause of the low wet well level has been corrected and the circuit has been manually reset. A low liquid level condition shall disable both pump motors. When the wet well rises above the low level point, both pump motors shall be automatically enabled. The low water alarm shall be furnished with SPDT dry contacts.
3. An alarm silence switch and relay shall provide maintenance personnel a means to de-energize the external alarm device while corrective actions are under way. After silencing the alarm, manual reset of the magnetic switch shall provide automatic reset of the alarm silence relay.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturer's instructions.
- B. Install pumping units and pump base in the bottom wet well structure and provide supports as required.
- C. After alignment is correct, grout as specified in Section 03300.
 - 1. Fill entire base and leave no gaps or voids.
 - 2. Do not embed leveling nuts in grout.
- D. Alarm outputs shall be connected to the existing Mission control panel. Contractor to Provide all materials and labor required to complete the connections.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Provide services of factory trained service engineer with a minimum of five (5) years' experience to assist in location of anchor bolts; setting, leveling, field erection, etc.; and coordination of piping, electrical and miscellaneous utility connections. Provide in accordance with Section 01665.
- B. Provide services of manufacturer's representative as specified in Section 01665.
- C. Provide operation and maintenance training as specified in Section 01665.

3.03 FIELD TESTING

- A. Certified Performance Tests: With discharge piping configured for the final operating conditions, conduct performance tests on each pump to determine pump shutoff head and full speed operating head and flow.
- B. The Contractor shall conduct a running pump test for a minimum of 4 hours, in the presence of the Engineer. The test shall indicate that the pumps conform to the head and capacities specified.
- C. The Contractor shall provide both factory and field acceptance testing of the RVSS Starters, I&C pumps control and alarms as specified in Division 13 and Division 16.
- D. The manufacturer shall furnish the services in the presence of the Engineer, of a qualified factory representative for a minimum of 8 hours to confirm the completed pump installation to be satisfactory. Compensation for such services shall be paid for by the Contractor.

- E. The pump supplier, after successfully completing the pumps and I&C panels field testing, shall issue a letter of certification on the equipment's installation and operation with regards to its acceptability for its warranty.
- F. Pump tests include all I & C testing. Test will include the testing of all associated controls.

3.04 SPECIAL TOOLS AND SPARE PARTS

- A. Furnish one set of all special tools required for the proper servicing of all equipment supplied under these Specifications, packed in a suitable steel tool chest with a lock. Special tools shall include any tools not available in ordinary hardware stores.
- B. Furnish one (1) set of the manufacturer's standard spare parts.

END OF SECTION

SECTION 11315

SEWAGE GRINDER PUMPS AND APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

- A. This Specification is specifically for the Partridge Circle Pump Station.
- B. Furnish, install, test and place into satisfactory operating condition wet pit submersible sewage pumps, guide rails, guide rails slide, straight through base connections, grab link assemblies, and control relays, each designed for pumping raw wastewater with minimum spherical diameter solids passage of 3”.

1.02 RELATED WORK

- A. Division 1 – General Requirements
 - 1. Section 01665 – Services of Manufacturer’s Representatives
 - 2. Section 01710 – Startup
 - 3. Section 01730 – Operations and Maintenance Manual
 - 4. Section 01750 – Spare Parts
 - 5. Section 01751 – Lubricants
- B. Division 9 - Finishes
- C. Division 13 – Instrumentation and Controls
- D. Division 15 - Mechanical
- E. Division 16 - Electrical Work

1.03 DESIGN REQUIREMENTS

- A. The Work shall include all accessories, and appurtenances necessary to make a complete system. Work shall conform to requirements for installation, materials, and equipment approvals of state, local, Underwriters' Laboratories, Inc., or other applicable codes, whether or not called for in detail on the drawings or in these specifications.
- B. All pump openings, internal passages, and internal recirculation ports shall be large enough to permit the passage of a sphere 4" in diameter, and any trash or stringy material which may pass through the average house collection system. Screens or any internal devices that create a maintenance nuisance or interfere with priming and performance of the pump shall not be permitted.
- C. Pumps and motors shall be capable of operating in a continuous submerged condition in vertical position in a wet pit installation. Pumps shall be mounted on two 2-inch guide rail with slide bracket for easy removal without having to enter the wet well.

- D. Certified dimensional drawings indicating size and locations of the priming recirculation port or ports shall be submitted to the Engineer prior to shipment.
- E. New pumps shall be capable of performing under the following operating conditions:

Partridge Circle Pump Station
2-Pumps (Submersible)

Pumps	Capacity (gpm)	TDH (ft)	Maximum Motor Horsepower	Maximum Speed (RPM)	Shut-off Head (ft)	Pump Runout
Single Pump Operation	47	52	5 ¹	3600	73	90 gpm @ 5 ft

- 1: Motors rated 230 volts, 1 phase, Inverter duty rated.
- 2: Motor shall not overload over the entire length of the curve.
- 3: Information based on Zoeller X71 submersible grinder pump

- F. The pumping units shall be designed to pump raw domestic sewage and discharge into a force main.

1.04 QUALITY ASSURANCE

- A. Pumps shall be the product of a single manufacturer with a minimum of ten years experience with equipment of the size and type specified operating in a similar arrangement.
- B. Equipment and accessories shall be the standard cataloged products of the manufacturer except as otherwise specified or indicated.
- C. Pump manufacturer to provide the submersible pump, pump base, guide rail slide brackets, upper guide brackets, straight through base connection, rails and appurtenances regardless of the manufacturer, as a complete and integrated package to insure proper coordination and compatibility of equipment.

1.05 SHOP TESTS

A. Motor Tests

- 1. Motor factory shop tests shall be in accordance with IEEE Standard 112, Appendix A, plus the factory's standard routine tests for the specified motor horsepower.

B. Pump Tests

1. Certified Performance Tests: Conduct performance tests per HI Grade 1U on each pump and motor unit to determine head, capacity, speed, and brake horsepower at not less than six points on the operating curve including rating point and best efficiency point. Test data shall be sufficiently comprehensive to produce guaranteed performance curves showing head versus capacity, efficiency, and brake horsepower for the rated speed. Engineer shall be supplied with the complete test procedure in advance of the testing. Test shall be witnessed and certified by a professional Engineer.
2. Hydrostatic Pressure Tests: Conduct hydrostatic pressure tests on each pump.
3. Demonstrate that all equipment is capable of continuous operation in satisfactory manner without mechanical or electrical defects or operational difficulties under suction and discharge conditions.
4. Repeat tests, if necessary, until results are obtained satisfactory to the Engineer.
5. Correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.
6. Conduct all tests in accordance with the latest standards of the Hydraulic Institute.
7. If the specified tests indicate the pump or motor will not meet the specifications, the Engineer has the right to require complete tests for all pumps and motors at no additional cost to the Owner.

1.06 REFERENCES

- A. ASTM A48 - Standard Specification for Gray Iron Castings.
- B. ASTM A276 - Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
- C. AFBMA
- D. Hydraulic Institute Standards.
- E. National Electrical Manufacturer's Association.

1.07 SUBMITTALS

- A. Submit to the Engineer for approval as provided in Section 01300, shop drawings showing details of construction and installation of all equipment furnished under this Section. The following shall be included:
 1. Shop drawings and materials of construction and performance of electric motors, pumps, controls, pipes, valves and fittings, equipment, conduit, wiring, wiring

devices, transformer and access manhole, rails and bracket.

2. Manufacturer's rating curves showing pump characteristics of pressure, capacity, brake horsepower, and efficiency. This information shall be prepared specifically for the pump proposed. Catalog sheet showing a family of curves will not be acceptable.
 3. Literature and drawings describing the equipment in sufficient detail, including materials of construction and parts list, to indicate full conformance with the detail specifications.
 4. Complete parts list for equipment furnished.
 5. Motor data such as HP, Volts, RPM, FLC, Efficiency, and p.f. as described herein.
 6. Complete wiring diagrams and schematics of all controllers, control panels, control devices, and operators furnished under this Section.
 6. Complete wiring diagrams and schematics of all power and control systems.
 7. Drawings depicting the mechanical seal configuration.
 8. Floor plans, sections and elevations showing a complete layout to scale of all equipment, piping, electrical conduits and wall sleeve installation locations and methods to provide watertight seals.
 9. Motor wiring diagrams for power and high temperature switches.
 10. Services of manufacturer's representative and warranties.
 11. Drawings and calculations indicating pipe support material, locations, and engineering data of support scheme.
- C. In the event that it is impossible to conform to certain details of the specifications due to different manufacturing techniques, describe completely all non-conforming aspects for review and approval by the Engineer.
- C. Submit under provisions of Section 01300.
- D. Pump and Motor Characteristics and Performance Data:
1. Provide guaranteed certified performance curves based on actual shop tests of mechanically duplicate pumping units, showing they meet specified requirements for capacity, head, horsepower, efficiency, and NPSH. For units of same size and type, provide curves for a single unit.

2. Catalog performance curves at required speed showing maximum and minimum impeller diameters available.
- E. Manufacturer's written warranty.
- F. Shop Test Results: One (1) electronic copy of pump performance test data, pump performance curves, hydrostatic test results and motor test results.
- G. Field Inspection Reports: Submit under provisions of Section 01700.

1.08 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Provide operation and maintenance instructions as specified in Section 01730. Note, both "Paper" and "Electronic" manuals are required.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of equipment.
- 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.
- D. Inspect and inventory items upon delivery to site and provide Engineer with inventory list.
- E. Store and safeguard equipment, material, and spare parts in accordance with manufacturer's instructions and deliver to Owner after completion of the work.

1.10 WARRANTY

- A. The manufacturer shall guarantee the pumps free from defects in workmanship and materials for a period of 5 years on a prorated basis. Labor costs will be included for the first 12-months of operation.

PART 2 PRODUCTS

2.01 ACCEPTABLE PUMP MANUFACTURERS

- A. Zoeller
- B. Additional pump manufacturers may be considered acceptable alternatives. Documentation shall be submitted with Bids for review and approval by the Engineer

that demonstrates compliance with project specifications, including dimensions, process mechanical, electrical, instrumentation and control.

- C. Should equipment which differs from the first named in this Section 2.01.A be offered and determined to be the equal of that specified, such equipment shall be acceptable only on the basis that any revision in the design and/or construction of the structure, piping, appurtenant equipment, electrical work, etc. required to accommodate such a substitution shall be made at no additional cost to the Owner and be as approved by the Engineer.

2.02 PUMP CONSTRUCTION

- A. The centrifugal grinder pump shall be listed by FM and CSA for hazardous environments. The castings shall be constructed of baked on epoxy coated class 30 cast iron. The motor housing shall be finned and oil-filled to dissipate heat and enable the unit to operate unsubmerged without damage to the motor. Air-filled motors shall not be considered equal because of their inability to dissipate heat from the motor. All external-mating parts shall be machined and sealed with a buna-n square ring. All fasteners exposed to the liquid shall be 300 series stainless steel. The motor shall be protected on the top side with an attached sealed junction box chamber which in the event of cord damage will prevent moisture wicking into the motor housing. The motor shall be protected on the lower side with a tandem mechanical seal arrangement with each seal having a separate spring assembly. The upper and lower ball bearings shall be capable of handling all thrust loads. The pump housing shall be of the concentric design thereby equalizing the pressure forces inside the housing, which will extend the service life of the seals and bearings. The top cap shall have cast in lifting lugs. The motor shall be protected by a moisture detection system, which will activate an alarm circuit if liquid is ever present in the upper junction chamber or lower seal cavity. Thermal sensors located in the oil-filled motor housing shall provide temperature protection.
- B. The pump shall be supplied with 50-feet of multiconductor power cord. It shall be SO type cord capable of continued exposure to the pumped liquid. Power cord shall be sized for the rated full load amp rating of the pump in accordance with the National Electrical Code. Power cable shall enter into the junction chamber through a compression type-sealing gland. Water sealing and strain relief is separated. Each individual conductor shall be sealed against wicking should the cable become damaged. The entire junction chamber shall be sealed off from the motor housing. The junction chamber shall contain a set of moisture detection probes, activating an alert signal in the case of liquid entry.
- C. The rated oil-filled motor with Class 1, Division 1, Group C and D construction shall be a Class F insulated NEMA B design rated for hazardous duty. At maximum load, the winding temperature will not exceed 250 degrees F unsubmerged. Since air filled motors are not capable of dissipating heat, they shall not be considered equal. Start capacitors and relay for single phase models shall be mounted externally from the

pump in a panel within 50 feet of the pump location. Thermal sensors located in the oil-filled motor housing shall provide temperature protection.

- D. Upper and lower ball bearings made of high carbon chromium steel shall be provided to prevent shaft deflection by withstanding all thrust and radial loads. The motor shaft shall be made of 41 6 SS and have a minimum diameter of 1 .25".
- E. Pump shall have a dual mechanical seal configuration with the seals mounted in tandem. Each seal assembly having carbon rotary and ceramic stationary faces with buna-n elastomer and 316 SS spring. It shall be equal to a Crane Type 21 configuration. Double seals with a common intermediate spring shall not be considered equal. The seal chamber shall contain a set of moisture detection probes, activating an alert signal in the case of liquid entry.
- F. The impeller shall be a fully balanced bronze casting with pump out vanes on the back shroud to keep debris away from the seal area. It shall be keyed and bolted to the motor shaft.
- G. The cutter and plate shall be constructed of 440 SS with a Rockwell C hardness of 55-60. The stationary cutter plate shall contain multiple machined orifices which enable the slurry to flow into the pump housing at an equalized pressure and velocity. The "star" cutter, rotating at 3450 RPM, shall shear all solids into a small particulate before passing through the orifices. Because of the extended service life of the "star" cutter, other cutter designs with tight clearances and those that grind on the circumference of the rotary plate shall not be considered equal.
- H. The exterior castings of the pump shall be protected with a baked on epoxy powder coat paint.
- I. .

2.03 Wet Well Guide Rail Base Assembly

- A. The discharge base with 3-inch discharge shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pumps shall connect to the guide rail base automatically and firmly, guided by two 2-inch schedule 40 316 stainless steel guide rails extending from the straight through discharge to the top of the station. Systems using guide cable in lieu of rigid guide bars or pipes shall not be considered acceptable. The sliding guide bracket shall be a separate part of the pumping unit, capable of being attached to standard 3 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly.

2.06 CONTROLS

- A. Pumping System Control Panel shall Zoeller EX7111 with all standard options.
- B. The panel shall include individual run time meters for each pump.
- C. Provide pump panel heater.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturer's instructions.
- B. Install pumping units and pump base in the bottom wet well structure and provide supports as required.
- C. After alignment is correct, grout as specified in Section 03300.
 - 1. Fill entire base and leave no gaps or voids.
 - 2. Do not embed leveling nuts in grout.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Provide services of factory trained service engineer with a minimum of five (5) years' experience to assist in location of anchor bolts; setting, leveling, field erection, etc.; and coordination of piping, electrical and miscellaneous utility connections. Provide in accordance with Section 01665.
- B. Provide services of manufacturer's representative as specified in Section 01665.
- C. Provide operation and maintenance training as specified in Section 01665.

3.03 FIELD TESTING

- A. Certified Performance Tests: With the suction and discharge piping configured for the final operating conditions, conduct performance tests on each pump to determine pump shutoff head and full speed operating head and flow.
- B. The Contractor shall conduct a running pump test for a minimum of 4 hours, in the presence of the Engineer. The test shall indicate that the pumps conform to the head and capacities specified.
- C. A 14-day operating period of the pumps will be required before acceptance. If pump performance does not meet the Specifications and shop drawing submittals, the

Contractor shall take corrective measures or the pumps shall be removed and replaced with pumps that satisfy the conditions specified at no additional cost to the Owner. The decision of the Engineer shall be final.

- D. The manufacturer shall furnish the services in the presence of the Engineer, of a qualified factory representative for a minimum of 8 hours to confirm the completed pump installation to be satisfactory. Compensation for such services shall be paid for by the Contractor.
- E. The pump supplier, after successfully completing the pumps and panels field testing, shall issue a letter of certification on the equipment's installation and operation with regards to its acceptability for its warranty.
- F. Pump tests include all I & C testing. Test will include the testing of all associated controls.

3.04 SPECIAL TOOLS AND SPARE PARTS

- A. Furnish one set of all special tools required for the proper servicing of all equipment supplied under these Specifications, packed in a suitable steel tool chest with a lock. Special tools shall include any tools not available in ordinary hardware stores.
- B. Furnish the manufacturer's standard set of spare parts.

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DIVISION 13

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SECTION 13300

INSTRUMENTATION AND CONTROLS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The Work of this Section shall include all labor, materials, and equipment required to provide a complete pump control systems, instrumentations, and alarm dialer programming. A single Instrumentation and Control System Supplier shall provide all labor, materials, equipment and services required to achieve this scope as specified herein and within the Contract Documents.
- B. The work shall include providing equipment and instrumentation for the Sewage Pumping Stations Upgrades located in Taunton, Massachusetts.
- C. The work shall include an interface for equipment provided under other Sections of the Contract Documents. In order for the equipment furnished and installed within this Section to function as complete systems there shall be close coordination with other equipment furnished under other Sections of the Contract Documents.
- D. Provide and configure new pump control panels and instrumentation for the Myles Standish Pump Station and the Davis Street Pump Station that shall include, but not be limited to, pump controller, power distribution equipment, motor controllers, surge protection devices, and instrumentation.
- E. Provide programming of the existing Mission Communications MyDro 150 alarm dialer at the Myles Standish Pump Station, the Partridge Circle Pump Station, the Wellesley Circle Pump Station, the School Street Pump Station, the Stevens Pump Station, and the Davis Street Pump Station.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals:
 - 1. Manufacturer's data, order sheet or equivalent for each individual instrument or device being supplied. The information shall include but not be limited to model number, exact chart, scale or calibration range, type of enclosure and mounting, input/output and power data and the instrument tag number (or loop number for auxiliary equipment). Sales literature will not be accepted.
 - 2. Manufacturer's outline and mounting dimensions for all field mounted devices, and scaled layout drawings for primary and supplemental control panels, including interfacing details for equipment to be supplied under DIVISION 11.
 - 3. Manufacturer's panel color selection with color samples.
 - 4. Complete master wiring diagrams including field wiring requirement, elementary or control schematics including coordination with other electrical devices operating in conjunction with the instrument control panels. Suitable outline

drawings shall be furnished for approval before proceeding with manufacture and shall include number of conduits and wires, size, tubing and mounting. It shall be required that this system supplier also refer to all other interrelated specifications and drawings. Therefore it is imperative that this system supplier obtains a complete set of contract specifications and drawings as part of the work and requirements of this portion of the system. Due to the complexity of the control functions, it is imperative the above drawings be clear and carefully prepared to facilitate interconnections with other equipment. Standard preprinted sheets or drawings simply marked to indicate applicability to this contract will not be acceptable.

5. The system supplier shall clearly identify any exception to the specification or drawings. Failure to do this will be grounds for rejection of the submittal.
6. The services of the instrumentation system vendor's factory engineer shall be included as part of the bid price to meet with the Engineer at his office for a minimum of two, 8-hour days to review shop drawings for this Section prior to approval by the Engineer.

B. For approval before release for manufacturing:

1. Instrument and control panel layout to scale or dimensioned with overall size mounting and field entries dimensioned.
2. Preliminary loop diagrams and logic diagrams in the I.S.A. & NEMA standard and shall include piping and wiring requirements for each loop.
3. All equipment to be furnished under this Section must be approved prior to any of this equipment being released for manufacturing unless otherwise noted by the Engineer.

C. Prior to final acceptance:

1. Final loop diagrams containing start-up data (to I.S.A. standard).

D. Shop drawings shall be submitted in accordance with Section 01300 - Submittals and include the following special conditions:

1. All material submitted for review shall be contained in one submission. The material shall be furnished in bound volumes as required for a complete submittal. Loose material submitted will not be reviewed. Partial submittals unless agreed to by the Engineer will not be reviewed. Sales bulletins or other general publications are not acceptable as submittals.
2. One set of reproducible drawings, size 11"x 17".
3. The instrumentation manufacturer shall furnish a complete set of the final approved wiring diagrams to the Electrical Contractor and supplier of filtration equipment.

- E. Shop drawing review period for this section shall extend beyond the specified period as defined in Section 01300 - Submittals. Due to the complexity of the system the review period allowed shall be a minimum of forty-five (45) days unless otherwise agreed to by the Engineer.
- F. Operation and Maintenance Manuals shall be submitted in accordance with the requirements of Section 01730 - Submittals.

1.03 RESPONSIBILITY FOR EQUIPMENT

- A. The Contractor shall be responsible for providing and placing in satisfactory operation all instruments and equipment necessary for a complete system. This shall include all piping, electrical connections, and system engineering as provided by a qualified Instrumentation and Control System Supplier, and accessories required by the Work of this Section or other related Work included under other Sections in the Contract Documents.
- B. The supply of the pump control panels and instrumentation shall be by a single Instrumentation and Control System Supplier. The supplier shall be responsible to the Contractor for: (1) satisfactory detailed design of a complete and coordinated system (2), start-up and testing services, (3) training, and (4) services to assure satisfactory operation.
- C. The Contractor shall not purchase separate equipment and attempt to assemble a system. This Work is to be performed by a qualified Instrumentation and Control System Supplier as approved by the Engineer.
- D. The Contractor shall furnish record drawings for each entire system. This shall include drawings for all locations with point to point wiring for the equipment. The drawings shall be complete and shall require on site verification and acceptance by the Engineer.
- E. The Instrumentation and Control System Supplier shall be required to furnish equipment that is installed under other Sections in the Contract Documents. The Contractor shall be responsible for coordinating this Section with the necessary equipment in order to provide for a complete installation. It shall be coordinated such that there is proper installation of this equipment between suppliers in order to avoid delays in completion due to availability of this equipment. The Instrumentation and Control System Supplier shall provide a separate submittal on this specific equipment for early approval in order to avoid delays.

1.04 DESIGN CRITERIA

- A. The Contractor shall provide complete and operational systems. This equipment shall be provided as described in this Section. It shall be the Contractor's responsibility to coordinate the installation of this equipment with all other associated equipment and to provide for a complete and operational system.
- B. The Work of this Section shall require field equipment interconnections. This Section shall describe the field equipment for interconnections but does not detail each specific point-to-point connection. It shall be the Contractor's responsibility to verify and coordinate final connections to all equipment.

- C. Control panel enclosures and components shall be Underwriters Laboratories (UL) recognized or listed, where such components are available. The complete control panel assembly shall be constructed by an accredited UL-508 fabrication and wiring assembly shop in accordance with UL-508 and related UL standards.
- D. The Work of this Section shall adhere to the requirements of the standards listed below as applicable. The latest edition in effect at the time of bid opening shall apply.
 - 1. American Petroleum Institute (API)
 - 2. The Instrumentation, Systems and Automation Society (ISA)
 - a. ISA S5.4, Instrument Loop Diagrams.
 - b. ISA S20, Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
 - c. ISA RP60.3, Human Engineering for Control Centers
 - d. ISA RP60.6, Nameplates, Labels, and Tags for Control Centers
 - 3. National Electrical Manufacturers Association (NEMA)
 - 4. National Fire Protection Agency (NFPA)
 - a. NFPA 70, National Electrical Code (NEC).
 - b. NFPA 79, Standard for Industrial Machinery.
 - 5. Underwriters Laboratories, Inc. (UL)
 - a. UL 508, Standard for Industrial Control Equipment.
 - b. UL 698A, Industrial Control Panels Relating to Hazardous (Classified) Locations.
 - 6. American Society for Testing and Materials (ASTM)
 - a. ASTM A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.05 INSTRUMENTATION AND CONTROL SYSTEM SUPPLIER

- A. The Instrumentation and Control System Supplier shall be one of the following pre-qualified Instrumentation and Control System Supplier's listed in alphabetical order.
 - 1. Electrical Installations, Inc.
Moultonboro, New Hampshire
603-253-4525
 - 2. Harbor Controls
North Kingstown, RI
401-667-0930

3. R. E. Erickson Co., Inc.
Walpole, Massachusetts
508-668-9330
- B. Only pre-qualified Instrumentation and Control System Suppliers shall be allowed to provide the Contractor with a price for inclusion in the General Bid.

1.06 OPERATION CRITERIA

A. WETWELL LEVEL MONITORING

1. Wetwell level shall be measured by a submersible level transducer mounted in the wetwell and shall be wired through an intrinsically safe isolator into the pump controller. The level shall be indicated on the pump controller. A High level, High-High level, and Low level float switches shall be installed in the wetwell also. The float switches shall provide backup alarm and direct hardwired control of the pumps in case of a pump controller failure.
2. The level transmitter shall provide a 4-20 mA DC output signal proportional to wetwell level to the pump controller. This signal shall be the primary means for wet well level alarm and control. High and low wetwell alarms shall be triggered by the input level analog signal via the pump controller
3. The float switches shall be wired through an intrinsically safe relay. The intrinsically safe relay shall be located within an isolated area in the pump control panel. A contact from the intrinsically the safe relays shall be wired via interposing relays to a the Pump Control Panel LED high-high level indication light and for pump back-up control.

B. PUMP OPERATION

1. The pump operation shall be automatically controlled by the pump controller.
2. Pump #1 and Pump #2, shall be capable of being manually or automatically assigned Lead, Lag status at the pump controller. A pump will retain it's assigned status unless manually changed by an operator or if automatic pump alteration is enabled. If automatic pump alteration is enabled, pump selection shall cycle through the next assigned status on the stop/start of the assigned lead pump.
3. Hand-Off-Auto (H-O-A) selector switches will be located on the pump control panel door. An auxiliary contact block on the H-O-A switch will be wired to the pump controller for the indication that the H-O-A switch is in the "Off" position. When the switch is in the "Auto" position the associated pump shall be controlled as described below.
4. The lead pump shall be controlled by the pump controller based on the wet well level transmitter. The lead pump shall come on when level in the wet well

exceeds the controller high level setpoint and shall run until the level drops below the controller low level setpoint.

5. The lag pump shall be controlled by the pump controller based on the wet well level transmitter. The lag pump shall come on when level in the wet well exceeds the controller high high level setpoint and shall run until the level drops below the controller low level setpoint.
6. Back Up Level Control
 - a. Back-up hardwired pump control logic utilizing three level switches and shall be provided.
 - b. If the wetwell level reaches the high level float switch level it is assumed that there has been a failure of the level transmitter and/or the pump controller and therefore the high level float switches and hardwired pump control logic shall be used for automatic pump control.
 - c. When wet well level activates the high level float switch, Pump #1 shall automatically start and run until wet well level drops below the low level float switch.
 - d. When wet well level activates the high-high level float switch, Pump #2 shall automatically start and run until wet well level drops below the low level float switch.
7. The pumps shall have a staggered delay start between them upon restoration of power so that they both do not start at the same time.

D. PANEL POWER FAILURE

1. Loss of 120 VAC power to the panel shall be indicated by door mounted LED light via a interposing relay powered by the 120VAC cabinet power.

E. ALARM DIALER INTERFACE

1. The following station alarms from the control panel shall be wired to inputs of an existing alarm dialer via interposing relay dry contacts
 - a. Panel power failure.
 - b. Wet well level high.
 - c. Wet well level low.
 - d. Pump #1 Alarm, including VFD and Soft Starter Fault.
 - e. Pump #2 Alarm, including VFD and Soft Starter Fault.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All equipment shall be of the latest proven design. 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.
- C. Transmission to and from analog devices shall be 4-20 mA DC. Analog signals run from an instrument located outside than the signal destination shall be isolated at the panel end and shall have surge/lightning protection at both ends.
- D. All signal converters, power regulators, or power converters shall be the responsibility of the Instrumentation and Control System Supplier. The operation criteria descriptions herein do not specify all hardware required for complete system operation. It is the responsibility of the Instrumentation and Control System Supplier to provide all necessary equipment for complete systems.
- E. All equipment necessary to complete the functional requirements of this Section shall be supplied by the Instrumentation and Control System Supplier and be of the same manufacturer to the maximum practical extent unless otherwise specified.
- F. All necessary fuses or switches required by the Instrumentation and Control System Supplier for their equipment shall be provided with the equipment. All instruments requiring an external power supply shall have an internal ON-OFF switch.
- G. All 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 loop functions. All devices, either remote or panel mounted, shall have an individual internal ON-OFF switch.
- H. Electronic transmitting equipment shall provide loop power. A true two-wire transmitter may have its loop power supplied in the receiving instrument, if available, or by a DIN-rail mounted power supply mounted in the receiving control panel. Provide an isolated redundant loop power supply configuration such that if a fault occurs in the output of the primary power supply then the backup power supply takes over without interruption.
- I. The panel shall have terminal blocks with 20 percent spares in addition to terminals for all wires including spare wires. Special care shall be exercised to carry grounding lines through such junction boxes with the least possible resistance.
- J. 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.
- K. All field electronics and outdoor control panel equipment shall be suitable for operation in ambient temperatures of -40 degrees Fahrenheit to 140 degrees Fahrenheit. All indoor

control panel located electronics shall be suitable for operation in ambient temperatures of 40 degrees Fahrenheit to 120 degrees Fahrenheit.

- L. All external connection points shall be made at terminal blocks with No. 6-32 or larger screws.

2.02 PUMP CONTROL PANELS (PCP)

- A. For the Myles Standish Pump Station provide a custom pump control panel (PCP-1) capable of controlling two separate 12 HP, 3-phase, 208 volt submersible sewage pumps. The panel shall contain but be not limited to a main power circuit breaker with through panel disconnect, distribution pump circuit breakers, soft start motor starters, relays, selector switches, indicating lights, pump controller, etc. A 120/208V volt, 3-phase, 4-wire, 100 amp power feed shall be provided to the control panel. Provide a lug for grounding connection of up to a No. 1/0 AWG conductor.
- B. For the Davis Street Pump Station provide a custom pump control panel (PCP-2) capable of controlling two separate 7.5 HP, 3-phase, 230 volt submersible sewage pumps. The panel shall contain but be not limited to a main power circuit breaker with through panel disconnect, distribution pump circuit breakers, variable frequency drives, relays, selector switches, indicating lights, pump controller, etc. A 120/240V volt, 1-phase, 3-wire, 100 amp power feed shall be provided to the control panel. Provide a lug for grounding connection of up to a No. 1/0 AWG conductor.
- C. Panel Enclosures
 1. Control panels shall be NEMA 12 constructed from 10 gauge steel. All seams shall be continuously welded and smooth. Doors shall have three point latching mechanism with vault type operating handle, continuous heavy duty hinges and provisions for pad locking. Door gaskets shall be neoprene attached with oil resistant adhesive. Panel dimensions shall not exceed 36" wide x 60" in height.
 2. The panels shall be free of dents or other defects.
 3. The panels shall have an angle frame. The frame and shell shall be welded construction.
 4. Data storage pockets shall be provided on the inside of each panel and shall be of sufficient size to hold all of the prints required to service the equipment.
 5. Each panel shall be provided with a key lockable front handle. Provide gaskets as required to maintain the panel NEMA rating as specified herein.
 6. Provide a door stop kit for the panel to secure the door in the 90-degree open position.
- D. All wiring within the panels shall be grouped together in harnesses and secured to the structure. Terminal blocks shall be provided for all external connections to the control panel and for all connections between the component mounting plate and enclosure mounted components to allow for easy removal of the component mounting plate if required for service. Terminal blocks shall consist of individual snap together contact

sections mounted on a common mounting channel. Terminal block sections shall have tubular screw contacts mounted in a nylon housing to resist breakage; phenolic or other rigid, brittle materials shall not be considered equal. Plan screw contacts requiring lugs to be installed on wires shall not be considered equal.

- E. A complete master wiring diagram and elementary or control schematic shall be furnished and submitted for approval prior to manufacturing. Diagram shall indicate at a minimum the power distribution circuit, pump power/control circuits, terminal and wire numbers, control devices, and pilot lights.
- F. The pump controller shall be a door mounted microprocessor based pump controller designed to perform level control and monitoring in a wide range of lift station applications. The pump controller shall operate the pumps based on the selected level setpoint value and the wet well level signal that shall both be displayed on the controller. The level input source shall be a 4- 20 mA pressure transducer. The pump controller shall alternate the pumps, perform lag pump delays, and provide high and low level alarms. The pump controller shall have non-volatile memory requiring no batteries. The pump controller shall be the Mercoid MPC JR, or approved equal.
- G. Circuit breakers shall be molded case, three pole with voltage and ampere ratings as required. A through door handle distribution circuit breakers for each pump shall be provided. The interrupting capacity shall be not less than 20KA, RMS symmetrical.
- H. Provide a soft start motor starter for each pump at the Myles Standish Pump Station
- I. Provide a variable frequency drive for each pump at the Davis Street Pump Station.
- J. A hand-off-automatic selector switch for each pump and pump lead and alternate selector switch shall be provided. Selector switches shall be three position maintained type of heavy duty oil-tight construction. Toggle switch types shall not be considered equal. Selector switch contacts shall be heavy duty, double-break, silver. Switches shall be mounted through the control panel enclosure.
- K. Pump running indicating, VFD Fault, wet well high, wet well low indicating lights shall be provided and be heavy duty, oil tight, push to test LED.
- L. Provide Elapsed Time Meters shall be non-reset meter for each pump to indicate elapsed time of operation of the pump from 0 to 99,000.9 hours. The meters shall be mounted through the pump control panel enclosure.
- M. Provide all controls and accessories as shown on the equipment motor wiring diagrams in the contract drawings. Specialized interface relays supplied by the equipment manufacture shall be installed in the Pump Control Panel at the assembly factory shop. Coordinate with the equipment manufacture for space requirements and delivery of the relays.
- N. The Instrumentation and Control System Supplier shall provide all instrument devices necessary for proper pump operation. This shall include all signal conditioning, signal isolation, surge/lightning protection and operational equipment for the system.

- O. Control panel(s), except as noted, shall be completely assembled and wired at the Instrumentation and Control System Supplier's factory. All panels shall be UL listed and labeled. Refer to the Contract Documents for exact location and layout of each of the panels.
- P. All control and alarm circuitry for shall be complete, including all necessary auxiliary relays, contactors, and isolation so as to require only wiring and connections to the equipment control circuit. All contacts for control of motor-operated or electrically operated equipment shall be rated not less than 1200 VA (10 ampere at 120 volts) unless otherwise specified herein.
- Q. Nameplates and Nametags
 - 1. Nameplates shall be provided for all front mounted equipment. The nameplates shall be approximately 1 inch by 3 inch and shall be 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. Nameplates shall be attached to panels by self-tapping stainless steel screws or rivets. Nameplates shall be provided for each panel identifying the panel and shall be located at the top center of the panel. Size of the nameplate shall be as required for proper visual identification.
 - 2. Nametags shall be provided for all equipment located within the control panel. Each and every device shall be tagged with permanently attached nametags with identification reference that 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.
- R. All panel equipment shall be pre-piped and/or pre-wired on or within the cabinet. All wiring shall comply with local and National Electrical Code requirements and shall be in open bundles wired to numbered terminals. Each cabinet shall have at least 25 percent spare additional terminals. A plug-in header with convenience outlets and flexible plug-in leads shall be supplied for each instrument power supply. An overhead, internal, gasketed fluorescent light shall be provided. Cabinet layouts shall be submitted to the Engineer for approval. Materials and equipment used shall be UL approved wherever such approved equipment and materials are available.
- S. All equipment shall be designed and constructed so that, in the event of a power interruption, the equipment provided under this Section shall resume normal operation without manual resetting of alarms or power source when power is restored. Therefore, no alarm points shall be activated upon restoration of power after a normal power outage unless it is a true alarm condition. Provide all devices or programming required to maintain this requirement.
- T. Terminal strips shall be provided for the purpose of connecting all control, power, and signal wiring. Provide separate terminal strips for each in order to isolate the different wiring types (power, control, and signal). All terminal strips shall be completely labeled and numbered throughout for each and every unit. Direct inter-wiring between equipment will not be allowed.
- U. 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 3 inches of the side panel or 6 inches of adjacent terminal. 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 identification mark shall also appear on the mounting sub-panel. All wiring shall be kept to the upper 3/4 quarters of the control panel.

- V. All miscellaneous components shall be heavy-duty industrial type, or equal. Mounting hardware shall be stainless steel or cadmium plated. All cutouts shall be made true and square with no ragged cuts. The finished cutout 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 supports shall be provided to insure a rigid stable structure.
- W. 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, one-pint containers of each color used shall be supplied with the panel for field touch up.
- X. Provide air circulating equipment to dissipate heat from control panel components and maintain interior temperatures of out of doors control panels within an acceptable range for proper operation of control panel components.
- Y. Provide a LED lighting fixture inside at top of panel with light switch and one duplex receptacle for convenience of 120 volt power during service and maintenance of equipment.
- Z. Provide ground lug.
- AA. Provide a high-intensity LED push-to-test pilot lights for indication of control panel power on. Control panel power on pilot light (white) shall be illuminated when there is AC utility or generator power provided to the control panel.

2.03 SOFT START MOTOR STARTERS

- A. Soft Start Motor starters shall be three phase, 60 Hertz, 480 Volt, open style, UL listed microprocessor based SCR controlled soft starter type with contactor bypass, overload protection and rated for motor horsepower size for the new submersible pumps. Each motor starter shall have LCD display, metering, run and alarm status dry contacts.
- B. The Soft Start Motor starters shall be capable of pump reduced voltage/current starting and then turning over to pump full rated voltage/current in line operation.

2.04 VAIRABLE FREQUENCY DRIVES

- A. Variable Speed Adjustable Drive shall be UL Listed solid state type in a NEMA 12 filtered open enclosure that is fan cooled with the filter element of the removable and replaceable type. Front access shall be provided. Top, rear and side access shall not be required. The enclosure shall be coated with an epoxy resin base and acrylic resin

enamel. The drive shall be arranged for 240 Volts plus 10 percent to minus 5 percent, single phase, 57 to 63 Hertz input converted into adjustable frequency/Voltage (208V-240V), 3-phase output in an ambient temperature of -10 to 40 degrees C. The VFD shall be capable of sustaining operation with a line voltage dip of 15 percent of normal operating voltage on a constant torque or variable torque load. During line dip the VFD shall automatically provide a speed drop allowing maximum capable speed for the duration of the input voltage dip. The drive efficiency shall be 97 percent or better at full speed and full load. Fundamental power factor shall be 0.98 at all speeds and loads.

- B. The control method shall be sinusoidal Pulse Width Modulation. Output Voltage shall be three phase, 208-240 Volts and output frequency shall be 0.1 to 66 Hz when shipped. Frequency shall be selectable by a digital keypad. The frequency resolution shall be 0.1 Hz and the accuracy shall be within 1.0 percent of the maximum frequency at 25 degrees plus or minus 10 degrees C. Voltage/frequency (V/f) characteristics shall be characterized by selectable patterns. Up to 82 control functions shall be programmed. The overload capacity shall be 110 percent continuous and a minimum two minute rating of 150 percent of rated current. The frequency setting signal shall be 4 to 20 mA. The VFD shall employ a full wave rectifier to prevent input line notching, DC bus choke, DC bus capacitors, and Insulated Gate Bipolar Transistors (IGBT's) as the output switching device. SCRs, GTOs and Darlington transistors are not acceptable.
- C. The adjustable parameters consisting of: accelerating time, decelerating time, upper and lower limit of output frequency, and 4 to 20 mA reference bias and reference gain shall be indicated on a digital display. Braking shall be achieved through capacitor charging and starting shall be achieved by external contact. The VFD shall be software configurable to automatically restart following power outage, overcurrent and overvoltage detection. Soft stall shall occur when motor runs continuously at overload.
- D. The drive shall be protected from stalling, overcurrent, overload, short circuit, overvoltage, undervoltage, loss of one (1) phase of input power, instantaneous power failure (approximately 30 msec), overheating, fuse burnout protection and earth (ground) fault detection. The fault cause shall be displayed (flickering) for overcurrent, short circuit, overload, overvoltage, overheating and earth (ground) fault. There shall be a main capacitor charging indicator for internal circuit. Fault shall be reset by a reset push button on the printed circuit board and an external reset contact.
- E. A digital display shall be a 2 line, 40 character unit with readout in plain English. The display shall be located on the door of the pump control panel enclosure.
- F. Internally mounted set point control shall be provided to receive either a 4 to 20 mAdc or 0 to 10 vdc analog input control signal from a process panel to control the speed of the motor. The drive shall be capable of receiving a dry contact input to override the analog input control signal and control the flow rate to 95%.
- G. Each drive shall be provided with the following accessories:
 - 1. "Local-Off-Remote" keypad switch for local/remote speed control. In the "Remote" mode, the motor speed shall be adjusted in response to the related remote 4 to 20 mA pacing signal. In "Local" mode the motor speed shall be adjusted in response to keypad entry speed and the VFD shall run when the "Hand-Off-Auto" selector switch is in "HAND". . In "Off" mode the VFD shall not run.

2. 4-20 mA speed feedback output signal.
3. Dry contact for remote indication of motor running status.
4. Dry contact at for remote indication of VFD fault conditions.

2.06 LEVEL ELEMENT/TRANSMITTER (SUBMERSIBLE PRESSURE TRANSMITTER)

- A. Type: Submersible pressure transmitter for waste water applications with vented cable, two-wire, piezoresistive pressure sensing technology with welded 316 stainless steel diaphragm.
- B. Operation Purpose: To sense pressure and produce a standard 4-20 mA DC output signal linear with level; sensing element -piezoresistive pressure sensor.
- C. Functional: Pressure ranges - 0 to 5 through 0 to 300 psig; proof pressure limit 1.5 times full scale; burst pressure limit - 2.0 times full scale; power supply - DC (loop powered); output - 4-20 mA DC.
- D. Physical: Wetted parts - 316 stainless steel, fluorocarbon; operating temperature range - minus 10° to plus 60°C; compensated temperature range - 0° to 50°C; cable - polyurethane jacketed, shielded with polyurethane vent tube and vent filter/vapor trap; mounting - suitable for mounting in a 4-in stilling well, suspended from cable.
- E. Provide aneroid bellows venting accessories with connection to transducer, din-rail mounted terminal blocks for termination of transducer signal wire and control panel signal wire, and din-rail mounted surge protection devices; Accessories - vent-hole or breather element to maintain atmospheric pressure within enclosure.
- F. Performance: Static accuracy - ± 0.50 percent of best fit straight line (BFSL), including the combined errors due to nonlinearity, hysteresis, and non-repeatability at 25°C; thermal error - ± 0.05 percent full scale output per degree Celsius (maximum deviation from a BFSL).
- G. Provide and mount a perforated PVC stilling well for each transducer to minimize interference with rags and solids.

2.07 LEVEL SWITCH - FLOAT TYPE

1. Float switches shall be of non-mercury type, 3½-in diameter hermetically sealed, molded polypropylene construction and include a Form C, tilt-type, switch rated for switching 10 ampere resistive loads at 120 VAC. Switches shall include 40 feet of nitrile PVC jacketed, Type SO, 3-conductor, No. 14 AWG cable suitable for underwater service. Switches shall be rated for the NEMA area in which installed. Switches shall also include Type 316 stainless steel mounting hardware and weighted cord collar. Switches shall be installed per the manufacturer's requirements.
2. Level switches shall be manufactured by Consolidated Electric Co., Flygt, Magnetrol, or equal.

2.09 MISCELLANEOUS EQUIPMENT

A. ELECTRICAL RELAYS

1. Electrical relays for handling power circuits shall be general purpose equal to IDEC, Omron, Allen-Bradley, Potter & Brumfield, or approved equal. Relays handling control, telemetering or alarm functions shall be general-duty, plug-in type, complete with dust and moisture proof enclosure equal to IDEC, Omron, Allen-Bradley, Phoenix Contact, Potter & Brumfield, or approved equal. Units shall be provided with integral indicating light to indicate if relay is energized. Units shall have DPDT relay contacts and be rated for 10 A at 120 VAC, 10 A at 24 VDC
2. Time delay relays shall have DPDT relay contacts and be suitable for on-delay or off-delay operation. Rated load shall be 10 A at 120 VAC, 10 A at 24 VDC. Units shall be provided with integral time-delay adjustment knob. Relays shall be provided with dust and moisture resistant covers. Relays shall be suitable for operating in a temperature range from -30° to 55° C. Units shall be adjustable and available in a single range or multiple ranges from 0.1 second to 10 hours. Time delay relays shall be UL listed. Mounting sockets matched to relay and mounting rails/holders shall be provided as required. Time delay relays shall be as manufactured by IDEC, Allen Bradley, or Engineer-approved equal.

B. INTRINSICALLY SAFE PANEL

1. Provide a panel to house intrinsically safe current isolators and intrinsically safe relays. The panel shall have din-rail mounting terminal strips for all wiring and shall receive power from the RTU control panel.
2. Intrinsically Safe Current Isolators
 - a. Din rail mounted intrinsically safe current isolators shall be furnished for interconnection of each wetwell level transmitters.
 - b. Operating voltage shall be 115 VAC, 60 Hz.
 - c. The intrinsically safe control circuit shall be approved by Factory Mutual and the Canadian Standards Association for Class 1, 119 111; Division 1; Groups A, B, C, D, E, F, G hazardous locations.
3. Intrinsically Safe Relays (IS Relays)
 - a. Din rail mounted intrinsically safe relays shall be furnished for interconnection of each float switch located in the wet well.
 - b. Operating voltage shall be 115 or 230 VAC, 50/60 Hz.
 - c. Load contacts shall be double pole, double throw and shall be rated for 10 amperes resistive load or 3 amperes inductive load at 120 VAC.

- d. The intrinsically safe control circuit shall be approved by Factory Mutual and the Canadian Standards Association for Class 1, 119 111; Division 1; Groups A, B, C, D, E, F, G hazardous locations.

2.10 SPARE PARTS

- A. 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, circuit breakers, power supplies, 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".
- B. Spare parts 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.
- C. Furnish one box of spare fuses of each type supplied. A box shall consist of a minimum of 12 fuses.
- E. Furnish six spare pilot light lenses and six spare LEDs of each color and type supplied.

2.11 PROGRAMMING OF EXISTING ALARM DIALER

- A. Program the existing Mission Communications MyDro 150 alarm dialer at each of the following pump stations.
- B. Myles Standish Pump Station and Davis Street Pump Station.
 - 1. The following station alarms shall be programmed into the alarm dialer
 - a. Panel power failure and Loss of Utility Power.
 - b. Wet well level high.
 - c. Wet well level low.
 - d. Pump #1 Alarm
 - e. Pump #2 Alarm
 - f. Generator Alarm.
 - g. Intrusion.
- C. Partridge Circle Pump Station and Wellesley Circle Pump Station.
 - 1. The following additional station alarms shall be programmed into the alarm dialer.

- a. Intrusion.
- D. School Street Pump Station and Stevens Street Pump Station.
- 1. The following additional station alarms shall be programmed into the alarm dialer.
 - a. Generator Alarm

PART 3 – EXECUTION

3.01 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 instrumentation and control systems.
- C. All workmen shall be skilled in the work to which they are assigned and all work shall be performed under the direct supervision of an experienced and competent Instrumentation and Control System Supplier foreman.
- D. All internal wiring of the control panel(s) shall be done by the Instrumentation and Control System Supplier in accordance with the drawings and instrument manufacturer's instructions and UL requirements.
- E. The Contract Documents indicate the extent of the interconnections between and the type of individual instrument. The proposed equipment shall be supplied complete with all mounting hardware and accessories to satisfy the functional requirements.
- F. All work shall be executed in full accordance with UL requirements and codes and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, the Instrumentation and Control System Supplier and ultimately the Contractor shall bear full responsibility for such violations and assume all costs arising there from this situation.
- G. Interfacing devices shall be compatible with the equipment to which they are attached and shall comply with the applicable specifications.
- H. Coordination with the process and equipment, in addition to standard quoted devices required to conform the instrumentation to the process, shall be the responsibility of the Contractor. The Instrumentation and Control System Supplier shall provide detailed information on the devices being supplied and the extent of the field installation required.
- I. Brackets and hangers required for mounting of equipment shall be provided as noted in the Contract Documents or as required. They shall be done in a workmanlike manner and not interfere with any other equipment. These devices shall be manufactured from non-corroding stainless steel, suitable to the installed environment.
- J. The Contractor shall investigate each space in the building through which equipment

must pass to reach its final location. If necessary, the equipment manufacturer shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

- K. The shield on each process instrumentation cable shall be grounded as directed by the manufacturer of the instrumentation equipment or as noted in this Section, but in no case shall more than one ground be employed for each shield. Only one end of shielded cable shall be grounded.
- L. Maximum practical separation shall be maintained between signal (analog, alarm, and status) conduits and power feeders and AC systems.
- M. All field conductors shall terminate at the control panel terminal board. Millivolt signal wires (i.e., thermocouple) may be connected directly to the input terminals of the receiving instrument if so specified.
- N. All wire ends shall be identified at both ends with wire markers.
- O. Lifting rings from cabinets/assemblies shall be removed. Hole plugs shall be provided for the holes of the same color as the cabinet.

3.02 START-UP

- A. Prior to final connection to the pump control panel, the Instrumentation and Controls Contractor shall thoroughly clean all work completed including the interior of all panelboards; and remove all dirt, trash, 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. It shall be the responsibility of the vendor to provide a factory trained and qualified serviceman from the manufacturer's of the equipment to TEST AND CALIBRATE ALL EQUIPMENT and to INSTRUCT the Contractor on EQUIPMENT INSTALLATION and the ENGINEER on operation of the equipment.
- C. No other instrumentation system manufacturer's personnel other than those persons directly from the service department of the manufacturer of the equipment shall be acceptable to perform this work.
- D. The start-up services shall be performed by qualified personnel from the service department of the equipment manufacturer with a minimum of five years experience on the equipment being provided by this contract, or equal.
- E. During the start-up, the Instrumentation shall provide sufficient personnel to aid with the start-up of the instrument and control equipment to be provided and installed by this Section and 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.

3.03 TESTING AND CALIBRATING

- A. Testing and calibration of equipment shall be done in the presence of the Engineer.
- B. Prior to electrical check out all breakers, switches and similar disconnect devices shall be placed in the off position.
- C. The panel and other equipment grounding shall be verified.
- D. Visual inspection and continuity testing shall be made to verify that no damaging wiring errors occur between power and signal wiring.
- E. The systems shall be checked for improper or accidental grounding.
- F. Each system and component shall be energized and their inputs simulated. The output shall be checked to verify the proper calibration and interaction with associated hardware.
- G. Hypotting shall not be permitted on instrument systems unless specific instructions are given to safeguard electronic equipment from damage.
- H. Prior to actuating a final control element (valve, level actuator, or variable frequency drive) the Instrumentation Contractor shall obtain the permission of the General Contractor and any other involved contractors to prevent damage to associated equipment.
- I. The factory serviceman shall verify the calibration and direction of the final control element in accordance with the requirements for each portion of the system.
- J. Instrument and control calibration and control loop checkout shall be the responsibility of the manufacturer of the equipment.
- K. The Instrumentation Contractor shall arrange for and obtain the services of a factory trained service qualified engineer from the manufacturer's of the equipment to perform the calibration and commissioning of the entire system.
- L. Each instrument shall be calibrated at 10 percent, 50 percent, and 90 percent using test instruments that are rated to an accuracy of at least five times greater than the instrument being checked. The test instrument shall have its accuracy traceable to the National Bureau of Standard as applicable.
- M. Upon completion of the work, the Instrumentation Contractor shall demonstrate to the Owner the proper operation of all equipment and systems.
- N. The Instrumentation Contractor submit to the Engineer all test data, inspection test certificates, manufacturers' warranties certified calibration data, certified prints, manufacturers' installation, operation and maintenance manuals, electrical wiring and control diagrams with all noted field modification for an as-built record for the system, and required and suggested spare parts lists.
- O. A factory test shall be scheduled by the instrumentation system manufacturer for the entire system. A simulated system layout which shall include all equipment and interconnections shall be arranged to perform all system functions. The testing shall be

performed in the presence of the Engineer. A two week written notification shall be provided to the Engineer to allow for scheduling the testing.

- P. Upon completion and satisfactory performance an approval notification shall be provided for this portion of the work for this Section. No equipment shall be allowed to be shipped from the factory without approval for this portion of the work.

3.05 SUPPLIER'S SERVICES

- A. The supervisory service of a factory-trained service engineer specifically trained on the type of equipment specified herein shall be provided 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 service engineer's services shall be provided for calibration, testing and start-up of the equipment.

3.06 PRODUCT HANDLING

- A. Upon completion of shop assembly and testing, all control panels shall be enclosed in heavy-duty polyethylene envelopes or secured sheeting to provide complete protection from dust and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving the equipment without removing protective covering. Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing and handling at the job site.
- B. 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.
- C. 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.
- D. A permanent stainless steel or other noncorrosive 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.
- E. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry 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 Instrumentation 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 Instrumentation Contractor or the apparatus shall be replaced by the Instrumentation Contractor at his own expense.

3.07 GUARANTEE

- A. For guarantee, refer to General Conditions.

CONTROL PANEL LIST										
Designation	Description	Location	NEMA Rating	Material	Min. Height	Min. Width	Min. Depth	Mounting	UPS	OIT
PCP-1	Myles Standish Pump Station Pump Control Panel	Myles Standish Pump Station	12	Galvanized Steel	60-in	36-in	12-in	Wall	NO	NO
PCP-2	Davis Street Pump Station Pump Control Panel	Davis Street Pump Station	12	Galvanized Steel	60-in	36-in	12-in	Wall	NO	NO

INSTRUMENTATION LIST								
TAG #	FACILITY	FUNCTION	INSTRUMENT	TYPE	LOCATION	RANGE	UNITS	REMARKS
LT-01	Myles Standish Pump Station	Wet Well Level	Level Transmitter	Submersible Pressure	Wet Well	0-30	FT	Provide Intrinsically Safe Current Barrier
LSH-01A	Myles Standish Pump Station	Wet Well High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSH-01B	Myles Standish Pump Station	Wet Well High High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSL-01	Myles Standish Pump Station	Wet Well Low Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LT-02	Davis Street Pump Station	Wet Well Level	Level Transmitter	Submersible Pressure	Wet Well	0-30	FT	Provide Intrinsically Safe Current Barrier
LSH-02A	Davis Street Pump Station	Wet Well High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSH-02B	Davis Street Pump Station	Wet Well High High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSL-02	Davis Street Pump Station	Wet Well Low Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier

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DIVISION 14

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SECTION 14600

HOISTING EQUIPMENT

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Furnish, install, test and place in satisfactory operation the hoisting equipment, complete with all supports, fastenings, and other appurtenances, as indicated on the Drawings and as herein specified.
- B. The Specifications and Drawings direct attention to certain required features of the equipment but do not purport to cover all details entering into its design and construction. Nevertheless, the Contractor shall furnish, shop test, deliver, install and field test all materials, equipment and appurtenances for the hoisting equipment complete in all details and ready for operation as specified herein, whether specifically mentioned in these Specifications or not.

1.2 RELATED WORK

- A. Division 1 – General Requirements
- B. Division 2 – Precast Concrete
- C. Division 5 - Metals
- D. Division 9 - Finishes
- E. Division 11 - Equipment
- F. Division 15 – Mechanical
- G. Division 16 – Electrical

1.3 QUALITY ASSURANCE

- A. The hoisting systems shall conform to the location, capacity, critical dimensions and other pertinent data listed in the “Equipment Schedule” included herein.
- B. All structural steel members of the handling system shall be designed in accordance with the specifications of American Institute of Steel

Construction, current edition, and any welded construction shall be in accordance with the standards of the American Welding Society.

- C. Castings, forgings, stampings, etc., shall have a safety factor of at least 5.
- D. Provide service of factory train service technician with training specific to the hoisting equipment provided.
 - 1. Provide service of manufacturer's representative as specified in Section 01665
- E. The precast concrete top slab shall be designed to include the pedestal connection for the davit crane.

1.4 Submittals

- A. Product Data: For each type of product indicated.
- B. Maintenance Data: For each product to include in maintenance manuals.
- C. Warranties: As specified in the General Conditions.

PART 2 PRODUCTS

2.1 GENERAL

- A. All hoisting equipment shall conform to the current standards set forth by the following:
 - 1. Hoist Manufacturers Institute - HMI 100, HMI 200 and HMI 400.
 - 2. American National Standard Institute ANSI B30.11, ANSI B30.16 and ANSI C1.
 - 3. American Institute of Steel Construction
 - 4. American Welding Society
 - 5. Crane Manufacturers Association of American Inc., (C.M.A.A.).
 - 6. Occupational Safety and Health Administration (O.S.H.A.)
- B. All hoisting equipment parts shall be proportioned so that all stresses and vertical or lateral deflections will be within conservative limits with minimum vibration. Rated load safety factors of at least five, based upon ultimate strength of the materials used, shall be employed.
- C. The Contractor shall verify all dimensions and clearances in the field prior to erection of the hoisting equipment and shall be responsible for the proper fitting and operation of the equipment.
- D. The capacity of each hoist shall be permanently marked in a conspicuous manner.

- E. Safety Devices: Comply with applicable safety codes, as directed by local authority having jurisdiction, and as follows.
 - 1 All hooks shall be safety type.
- F. Align structural beam with the monorail; determine hanger locations according to loading requirements.

2.2 ACCEPTABLE MANUFACTURERS

- A. Davit Crane: Davit shall be manufactured by Thern Incorporated, or be an acceptable equivalent product.

2.3 EQUIPMENT

- A. Davit Crane

Myles Standish

1. The hoisting equipment shall be the Commander 2000 Model M2 Davit Crane with Drill-Motor Drive, as manufactured by Thern Incorporated of Winona Minnesota, or approved equal.
2. Capacity of davit crane shall be 1300 pounds at the C4 position and shall have the following properties:
 1. Crane shall have lift capabilities of 45 feet.
 2. Hooks shall be of high grade, forged steel, and shall have swivel, antifriction bearings.
3. Fasteners
 - a. Studs, nuts, washers, and fasteners shall be Type 304 stainless steel and shall be furnished with the hoisting equipment.
4. Cable
 - a. Cable shall be 1/4" x 60 feet 304 stainless steel wire rope.
5. Crane
 - a. Crane shall have an internal mechanical brake that works instantly when operation is stopped, and holds the load.
 - b. Galvanized Finish Crane
 - c. Pedestal Base with cap
 - d. Adjustable Boom with ratchet jack
 - e. Shall be Model M2 for compatibility with Drill-motor drive.
6. Drive Drill
 - a. 11 amp, 120 VAC, 330 rpm drill motor power to drive the hand winch.
 - b. Include 1-1/8" hex socket drive

Partridge Circle

1. The hoisting equipment shall be the First Mate 5PF5 Davit Crane, as manufactured by Thern Incorporated of Winona Minnesota, or approved equal.
3. Capacity of davit crane shall be 500 pounds at position “A” and shall have the following properties.
4. Crane shall have lift capabilities of 25 feet.
5. Hooks shall be of high grade, forged steel, and shall have swivel, antifriction bearings.
6. Fasteners
 - a.Studs, nuts, washers, and fasteners shall be Type 304 stainless steel and shall be furnished with the hoisting equipment
7. Cable
 - a.Cable shall be 1/4” x 45 feet 304 stainless steel wire rope.
8. Crane
 - a.Crane shall have an internal mechanical brake that works instantly when operation is stopped and holds the load.
 - b.Galvanized Finish Crane.
 - c.Pedestal Base with cap.
 - d.Adjustable Boom with ratchet jack

Wellesley Circle

2. The hoisting equipment shall be the First Mate 5PT10 Davit Crane, as manufactured by Thern Incorporated of Winona Minnesota, or approved equal.
9. Capacity of davit crane shall be 550 pounds at position “A4” and shall have the following properties.
10. Crane shall have lift capabilities of 25 feet.
11. Hooks shall be of high grade, forged steel, and shall have swivel, antifriction bearings.
12. Fasteners
 - a.Studs, nuts, washers, and fasteners shall be Type 304 stainless steel and shall be furnished with the hoisting equipment
13. Cable
 - a.Cable shall be 1/4” x 45 feet 304 stainless steel wire rope.
14. Crane
 - a.Crane shall have an internal mechanical brake that works instantly when operation is stopped and holds the load.
 - b.Galvanized Finish Crane.
 - c.Pedestal Base with cap.
 - d.Adjustable Boom with ratchet jack

B. EQUIPMENT SCHEDULE

Hoist Location	Myles Standish Davit	Partridge Circle	Wellesley Circle
Number Required	1	1	1
Rate Use	Outdoor	Outdoor	Outdoor
Suspension Type	Safety Hook	Safety Hook	Safety Hook
Capacity	1300 pounds at C4 position	500 pounds at position A	550 pounds at position A4
Hoist Type	Manual / drill	Manual	Manual
Cable Length	60 feet	45	45

C. Fasteners

1. Studs, nuts, washers, and fasteners shall be Type 304 stainless steel and shall be furnished with the hoisting equipment.

2.4 Finish

- A. Finish: All steelwork and machinery except bearing surfaces, shafts, chain, cable, and stainless steel shall have factory applied galvanized coating. Surfaces to be galvanized shall be thoroughly dry and free from rust, grease or dirt prior to application.
- B. Field painting as specified in Section 09900 - Painting.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All equipment shall be installed in accordance with the manufacturer's written instructions, as approved, and all equipment and materials required for proper installation shall be provided.
- B. It shall be the responsibility of the Contractor to coordinate the work included under this section of the specifications with other related work specified herein to insure that all the equipment shall operate to perform the designated functions in a proper and acceptable manner.
- C. Anchor bolts, expansion bolts, studs, nuts, washers and fasteners shall be set as per manufacturer's recommendations.

3.2 ADJUSTING

- A. Adjust hoists to operate smoothly under all load conditions, without malfunction.

3.3 FIELD ACCEPTANCE TESTS

- A. Test hoists, at the rated load, in the presence of the Engineer.

3.4 TOOLS AND LUBRICANTS

- A. Furnish a complete set of any special tools required for the maintenance and operation of this equipment, as designated by the equipment manufacturer.
- B. A one-year supply of each type of lubricant required for each piece of equipment and one grease gun for each type of lubricant required shall be furnished under this Section.

END OF SECTION

DIVISION 15

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SECTION 15050

PIPE PENETRATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for furnishing and installing pipe penetration assemblies. This Section covers materials for various pipe penetration configurations. Refer to the Contract Drawings for details of assembly and for location.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A53, Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- B. American National Std. Institute (ANSI)/American Water Works Assoc. (AWWA)
 - 1. ANSI/AWWA C151/A21.51, Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds for Water or Other Liquids

1.03 SUBMITTALS

- A. Submit to in accordance with SECTION 01300, manufacturers' literature on all items to be furnished, installation instructions, and where applicable, fire rating and certified test results of the various components.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Unless otherwise shown all pipe sleeves shall be Schedule 40 galvanized steel pipe conforming to ASTM A53. Provide a 2-in minimum circumferential water stop welded to exterior of sleeve at its midpoint. Ends of sleeves shall be cut, ground smooth, and shall be flush with the wall or ceiling and extend 2-in above finished floors. Sleeves required to be sealed by caulking shall be sized as required. Sleeves required to be sealed with mechanical seals shall be sized in accordance with the seal manufacturer's recommendations, and shall be a single seal for wall thicknesses up to and including 12-in; two mechanical seals shall be provided for wall thicknesses greater than 12-in. Sleeves for insulated piping shall be sized to accommodate the approved insulation.

2.02 WALL CASTINGS

- A. Unless otherwise shown, wall castings shall be ductile iron conforming to ANSI/AWWA C151/A21.51, thickness Class 53, diameter as required. Flanges and/or mechanical joint bells shall be drilled and tapped for studs where flush with the wall. Castings shall be

provided with an intermediate ½-in thick by 2-in minimum circumferential flange/waterstop, integrally cast with or welded to the casting, located such that it falls within the middle third of the wall.

2.03 SEALING MATERIALS

- A. Mechanical seals shall be modular, adjustable, bolted, mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve. The seal shall be rated by the manufacturer for 40 feet of head or 20 psig. Mechanical seals shall be Link-Seal, manufactured by Thunderline Corp., Wayne, MI., or equal.
- B. Caulking for iron, steel and copper piping shall consist of braided oakum packing followed by poured molten soft virgin lead. Minimum length of lead segment shall be one half of pipe diameter, or six inches, whichever is less. Lead shall be flush with end of sleeve. Cooled lead shall be expanded with a caulking iron to form a water seal.
- C. Sealant shall be a two part foamed silicone elastomer as manufactured by Dow Corning Co., product No. 3-6548 silicone R.T.V.; 3M brand fire barrier products caulk C.P. 25 and 3M brand putty 303; or Flame-Safe fire stop systems Fig. No. FS-500 by Thomas & Betts Corporation. Packing shall be a fire retardant pliable material, Fig. 310 by Sealtite Co., White Oakum W.S.-600 by American Manufacturing Co., or equal. Sealant bead configuration, depth and width shall be in accordance with manufacturer's recommendations.

2.04 MISCELLANEOUS MATERIALS

- A. Bonding compound shall be Sikadur Hi-Mod epoxy by Sika Corporation, equal by Euclid Chemical Corporation; Master Buildings Company or equal.
- B. Non-shrink grout shall be Masterflow 713 by Master Builders Company, Euco N-S by Euclid Chemical Co.; Five Star Grout by U.S. Grout Corp. or equal.
- C. Galvanized escutcheon plates shall be provided for all exterior sleeved wall penetrations above finished grade.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Assemble and install components of pipe penetration assemblies as detailed in the Contract Documents.

END OF SECTION

SECTION 15060

PROCESS PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to furnish, install, joint and test miscellaneous pipe, fittings, and appurtenances, (including special castings), indicated on the Drawings and specified in this Section.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading
2. Section 02622 - Polyvinyl Chloride Gravity Sewer Pipe
3. Section 09900 - Painting
4. Section 15050 - Pipe Penetrations
5. Section 15140 - Hangers and Supports
6. Section 15260 – Exterior Piping Insulation

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A47, Specification for Ferric Malleable Iron Castings.
2. A53, Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. A182, Specification for Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service.
4. A183, Specification for Carbon Steel Track Bolts and Nuts.
5. A193, Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
6. A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service.
7. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
8. A312, Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
9. A320, Specification for Alloy/Steel Bolting Materials for Low Temperature Service.
10. A403, Specification for Wrought Austenitic Stainless Steel Piping Fittings.
11. A536, Specification for Ductile Iron Castings.
12. A563, Specification for Carbon and Alloy Steel Nuts.
13. B88, Specification for Seamless Copper Water Tube.
14. B135, Specification for Seamless Brass Tube.
15. C552, Specification for Cellular Glass Thermal Insulation.
16. D1785, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
17. D2513, Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
18. D2992, Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings.
19. D2996, Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

- B. American Water Works Association (AWWA)
 - 1. C606, Standard for Grooved and Shouldered Joints.
 - 2. C651, Standard for Disinfecting Water Mains.
- C. American National Standards Institute (ANSI)
 - 1. A21.4, Standard for Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water.
 - 2. A21.10, Standard for Gray-Iron and Ductile-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
 - 3. A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
 - 4. A21.15, Standard for Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges
 - 5. A21.50, Standard for Thickness Design of Ductile-Iron Pipe.
 - 6. A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds, or Sand-Lined Molds, for Water or Other Liquids.
 - 7. A21.53, Ductile Iron Compact Fittings for Water and Other Liquids.
 - 8. B16.1, Standard for Ductile Iron Pipe Flanges and Flanged Fittings.
 - 9. B 16.3, Malleable Iron Threaded Fittings, Class 150 and 300.
 - 10. B16.5, Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.
 - 11. B 16.9, Factory-Made Wrought Steel Butt Weld Fittings.

1.03 SUBMITTALS

- A. In accordance with SECTION 01300 submit the following:
- B. Shop Drawings
 - 1. Piping layouts in full detail.
 - 2. Location of pipe hangers and supports.
 - 3. Location and type of backup block or device to prevent separation.
 - 4. Large scale details of all wall penetrations and special castings.
 - 5. Schedules showing the material and thickness or class of all pipe, fittings, special castings, couplings, expansion joints, and other appurtenances.
 - 6. Details of pipe lining, coating, wrapping, insulation and painting of all pipe lines.
 - 7. Points of location of piping identification signs.
 - 8. Other piping appurtenances and data pertinent to the layout of pipe lines whether specifically mentioned in the Specifications or shown on the Drawings.
- C. Certificates
 - 1. Sworn certificates in duplicate of shop tests showing compliance with appropriate standard.
 - 2. Design Computations shall be included in the submittal, for the purpose of record only, and certified by piping manufacturer.
- D. Submit manufacturer's certificates of conformance.
- E. Submit certified copies of test reports.

1.04 QUALITY ASSURANCE

- A. Ductile Iron Pipe

1. Inspect and test at foundry according to ANSI Standards.
2. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.
3. Owner reserves right to perform visual inspection and hammer test before installation.

PART 2 PRODUCTS

2.01 PIPE SCHEDULE

A. General

1. Unless otherwise called for by the Contract Drawings or elsewhere in these specifications, the following is a guide as to types of materials and jointing required for piping under this contract.
2. The lack of mention of any specific pipe shall not relieve the Contractor from the responsibility of furnishing and installing all piping required for completion of the Work.
3. Piping listed is exposed unless stated otherwise.

B. Potable Water

1. Three inches and smaller
 - a. Type L (medium wall) hard temper copper with soldered fittings. Red brass pipe required around equipment, and in other locations where vibration may occur.
 - b. Buried service - Type K, soft temper.
2. Greater than three inches
 - a. Ductile-Iron pipe and fittings, flanged joint, cement lined.
 - b. Buried service – use restrained mechanical joint.

C. Process Wastewater, Vent,

1. Three inches and smaller – na.
2. Greater than three inches
 - a. Ductile-Iron pipe and fittings, flanged joint, cement lined.
 - b. Buried service – use restrained mechanical joint.

D. Compressed Air

1. All compressed air piping - (except as noted below) copper Type K heavy wall, hard temper with soldered fittings.

E. Wet Well Mixing (Compressed Air)

1. Stainless Steel,
 - a. 2 inches and smaller, Schedule 40S, Butt welded, Socket weld or flanged as indicated.

F. Sump Pump Piping

1. Schedule 80 PVC. All fittings shall be of the same material and classification and shall be of the solvent-socket weld type unless noted otherwise on the Contract Drawings.
2. Tubing as recommended by the pump manufacturer, as detailed on the Contract Drawings or as specified.

G. Gravity Sewers

1. In accordance with SECTION 02622.

2.02 DUCTILE-IRON PIPE AND FITTINGS

- A. In accordance with Specification Section 15070.

2.03 EXTERIOR DUCTILE IRON PIPE FOR BURIED SERVICE

- A. In accordance with Specification Section 02618

2.04 COPPER PIPE AND FITTINGS

A. Pipe

- 1. In accordance with ASTM B 88.

B. Fittings

- 1. Cast bronze or wrought copper and bronze solder-joint pressure fittings.
- 2. Manufactured by Mueller Company, NIBCO, Inc.; or equal.

C. Unions

- 1. Solder type, with brass-to-brass seats. Gasketed unions are not acceptable.

D. Solder

- 1. Silver solder shall be used for making all buried joints.
- 2. For air piping, solder shall be 95 percent tin and 5 percent antimony.

E. Insulating Union, where copper piping is connected to steel pipe.

- 1. Manufactured by EPCO Sales, Incorporated, or Capital Manufacturing Co., or equal.

F. Tapped Cap, where copper pipe is connected to ductile iron pipe, furnish and install a tapped cap, Flow F-1402, or ACIPCO Type A-338 or equal, and a brass corporation stop, Type H15025 by Mueller Co., or equal.

G. Where more rigidity is required in erecting and supporting copper pipe, the Contractor may, at his option or when so directed by the Engineer, substitute brass pipe.

2.05 BRASS PIPE AND FITTINGS

- A. Pipe in accordance with ASTM B 135, drawn temper. Fittings shall be brass.

2.06 STEEL PIPE AND FITTINGS

A. Pipe

- 1. Black steel and Steel pipe to be in accordance with ASTM A53. Steel pipe shall be Schedule 40 and Schedule 80 as specified and shown in the Contract Drawings.

B. Fittings

- 1. Fittings used on black steel pipe lines two and one-half (2-1/2) inches or less in diameter, unless otherwise specifically called for, shall be standard weight, one hundred fifty (150) pound, beaded, malleable iron.
- 2. Fittings used on black steel pipe lines three (3) inches and larger shall be of the long radius design of standard weights in accordance with ANSI B16.9.

3. Fittings for compressed air shall be 300 lb. black malleable iron screwed fittings.
4. Malleable iron screwed fittings to be in accordance with ANSI B16.3.
5. Hot-dipped galvanized malleable iron fittings shall be used on all galvanized steel pipe lines. Malleable iron grooved end fittings to be in accordance with ASTM A47 and be hot-dipped galvanized.

C. Couplings

1. Couplings, used on black steel pipe lines three (3) inches and larger in diameter, shall be,
 - a. Exposed pipe: Style 38 steel compression couplings as manufactured by Dresser Industries.
 - b. Buried pipe: Type 411 cast compression couplings as manufactured by Smith-Blair, Inc.,
 - c. or equal.

D. Protective Coatings

1. All natural gas, and vent pipes shall be wrapped with a protective coal tar tape or heavily coated with Koppers Bitumastic No. 50 or equal. After testing, all joints shall be wrapped or heavily coated with Bitumastic No. 50 or equal.
2. All ungalvanized (black) steel piping for interior use, that is not covered by insulation, shall be primed and painted as specified under painting schedule of SECTION 09900.

2.07 SEAMLESS CARBON STEEL PIPE AND FITTINGS

A. Pipe and Fittings

1. In accordance with ASTM A53, Grade A.
2. Wall thickness 0.134 inches, minimum.

B. Fittings

1. Malleable Iron, 150 lb. service rating with threaded joints
2. Reducers and Increases to be concentric style.

2.08 STAINLESS STEEL PIPE AND FITTINGS

A. Pipe

1. In accordance with ASTM A312, Type 304 or Type 316 as specified, seamless annealed, pickled and passivated.
2. Type 304L or Type 316L for welded joints.

B. Fittings

1. Threaded Forged, in accordance with ASTM A182, Grade F304 or F316, 3,000 pound WOG.
2. Socket Weld Forger, in accordance with ASTM A182 Grade F304L of F316L, 2,000 pound WOG.
3. Butt Welded in accordance with ASTM A403 Grade WP304L or WP316L conforming to ANSI B16.9, fitting wall thickness to match adjoining pipe.
4. Long radius elbows unless indicated otherwise.

C. Flanges

1. Forged in accordance with ASTM A182 Grade F304L or F316L, Class 150 or 300, slip on welding neck, 1/16 inch raised face conforming to ANSI B16.5.

D. Gaskets

1. 1/16 inch, of material to suit intended use, and appropriate configuration for raised face or flat face flanges.

E. Bolting

1. General conditions, Type 316 in accordance with ASTM A193 Grade B8M hex head bolts and ASTM A194 Grade 8M hex head nuts.
2. Corrosive conditions, Type 304 stainless steel bolts in accordance with ASTM A320 Grade B8 with Copper silicon hex head nuts in accordance with ASTM B98 Grade A.
3. Mating to cast iron, and flat gasket, provide ASTM A307 Grade B hex head bolts and ASTM A563 Grade A heavy hex nuts.

F. Thread Lubricant

1. Teflon tape or Anti seize type.

2.09 STAINLESS STEEL TUBING AND FITTINGS

A. Tubing

1. In accordance with ASTM A312, Type 316 seamless, soft annealed, 0.083 inch, minimum wall thickness.

B. Fittings

1. Flareless Compression Forged in accordance with ASTM A182 Grade F304 or F316.
2. Socket Welded in accordance with ASTM A182 Grade F304L or F316L.

2.10 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. Pipe

1. Rigid, unplasticized, and in accordance with ASTM D1785, Type 1, Class 1220.
2. Suitable for field cutting, welding, bending and couplings, and shall be Scheduled 80 unless otherwise shown on the Drawings.
3. Sizes shall be as shown on the Drawings.
4. Bundled or packaged in such a manner as to provide adequate protection for the ends, or plain, during transportation from the manufacturer to the Contractor.

B. Fittings and Appurtenances

1. Fittings to be solvent-socket weld type, or flanged as shown on the Contract Drawings.
2. Union connections and connection to pipe of other material shall be made with pipe flanges and 1/16 inch rubber gaskets.
3. Gaskets shall be resistant for the type of service intended.

2.11 AIR SERVICE HOSE

- A. 3/8-inch inside diameter synthetic rubber hose with inner and outer tubes of oil resistant synthetic rubber with two braids of rayon rated for 300 psi.
- B. Hose end shall have saflowmatic adapter with male thread and a reusable fitting between hose and adapter.
- C. Each air station shall have a pistol grip blow gun made of die cast aluminum with hang up hook and standard brass nozzle.

- D. Provide at each air station a prep-air full size 3/8-inch T-bar lub-air-ator with transparent bowls and bowl guards.
- E. Air station pipe end shall have quick connect couplings saflowmatic with female thread or approved equal.

2.12 ADAPTERS

- A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.13 FLEXIBLE PIPE COUPLINGS

- A. Where flexible connections in the piping are indicated on the drawings, they shall be obtained by the use of sleeve-type couplings, split couplings or non metallic couplings.
- B. Non-metallic coupling
 - 1. Suitable for 200 psi working pressure.
 - 2. Coupling body to be EDPM construction.
 - 3. Retaining rings to be 316 stainless steel.
 - 4. Minimum of 4 tie rods connecting flanges of the coupling.
 - 5. Type J-1W, Wide Arch Expansion Joint manufactured by RedFlex or equal.
- C. Sleeve-Type Couplings
 - 1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
 - 2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
 - a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
 - 3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
 - a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
 - 4. Nuts and Bolts to be **[galvanized-steel] [high strength, low alloy steel] [stainless steel]**, unless noted otherwise.
 - 5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
 - 6. Provide with fusion bonded epoxy finish.
 - 7. Conform to requirements of AWWA C219.
- D. Split Couplings
 - 1. Split couplings may be used for connecting ductile-iron pipe. If split couplings are used with grooved pipe, the minimum pipe wall thickness shall be as specified under AWWA C606.
 - 2. Split couplings shall be made of malleable iron and shall be NAPPCO couplings made by North American Pipe Products Co.; or acceptable equivalent products.
 - 3. Where split couplings are furnished in lieu of flanged joints the joint shall be of the rigid type with pipe grooves cut to bring the ends of the pipe solidly together. The beam strength of the joint shall be equal to or greater than that of a flanged joint.

4. Where split couplings are indicated to provide for expansion or flexibility, the pipe grooves shall be cut to provide the necessary expansion or flexibility.

2.14 FILLING RINGS

- A. Provide suitable filling rings where the layout of the flanged piping is such as to necessitate their use. In materials, workmanship, facing, and drilling, such rings shall conform to ANSI Class 125 standard.
- B. Filling rings shall be of suitable length with nonparallel faces and corresponding drilling, if necessary, to ensure correct assembly of the adjoining piping or equipment.

2.15 WALL CASTINGS

- A. Wall castings shall be of the sizes and types indicated on the drawings. Flanges, facing and drilling shall conform to ANS A21.10 except that where required, as where a flange is substantially flush with the face of a masonry wall, flanges shall be drilled and tapped for studs. Other dimensions shall be substantially equal to corresponding parts of standard fittings. A central fin not less than 1/2-inch thick and 1-1/2-inch to 2-inch high shall be cast on the barrel at a point that will locate it midway through the wall to form a water stop.

2.16 RESTRAINTS

A. General

1. All valves and fittings shall be restrained, so that all thrusts shall be supported independent of the piping system.
2. All restraints shall conform to pipe manufacturer's recommendation.

B. For interior piping, restraints shall be located as follows:

1. Anchors shall be placed so all forces will be balanced.
2. 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.
3. Guides shall be used to prevent transverse motion at flexible couplings used as expansion joints.

C. Tie Rods

1. On piping, where flexible couplings are located near fittings or valves, stainless steel tie rods shall span the coupling from the two adjacent flanges.
2. Where the Engineer intends to have flexible couplings used as expansion couplings, tie rods may be omitted.
3. All tie rods shall be sized, spaced and installed according to the manufacturer's recommended procedure, or as directed by the Engineer.

D. Thrust Blocks

1. Constructed at all exterior pipe fittings 22-1/2° and over, and valves, unless specifically ordered otherwise by the Engineer.
2. The blocks shall be placed against undisturbed soil or against soil which has been compacted as specified in Division 2 for structures and pipes.
3. Concrete used for thrust blocks shall be 3000 psi strength.

2.17 HANGERS AND SUPPORTS

- A. In accordance with SECTION 15140.
- B. In addition to the hangers and supports spaced as specified elsewhere in this specification, furnish and install additional hangers and supports at all valves, fittings and pipe line equipment. Holding devices for valves and other pipe line appurtenances shall be designed and constructed to hold each unit securely.
- C. Where indicated on the Drawings or otherwise required, piping supports shall consist of concrete piers or fabricated steel supports. In these instances, materials and workmanship shall be in full compliance with Division 3 of these specifications.
- D. Furnish and install all supports necessary to hold the piping and appurtenances in a firm, substantial manner (as determined and/or directed by the Engineer) at the lines and grades indicated on the drawings or specified. The design and fabrication of such supports shall be the responsibility of the Contractor as part of the work.
- E. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification from the manufacturer stating that such requirements have been complied with.

2.18 PIPE PENETRATIONS

- A. In accordance with SECTION 15050.

2.19 PIPE INSULATION (FOR EXPOSED WATER AND FORCE MAINS)

- A. Buried or exposed Service
 - 1. Cellular glass type made specifically for thermal insulation of underground piping and is compatible with the piping material.
 - 2. Insulation composed of all glass sealed cells having no binders or fillers.
 - 3. The completed product shall be rigid and impermeable with ultimate compressive strength shall be at least 100 psi.
 - 4. Thermal conductivity of the cellular glass shall be no higher than 0.40 BTU/sq ft/F°/in.
 - 5. Cellular glass thickness shall be 2-inches thick and comply with all requirements of federal specification HH-1-551 and ASTM C552.
 - 6. Bands for securing the insulation to the pipe shall be 0.5 inches wide by 0.020 inches thick and shall be made of stainless steel.
 - 7. Jacketing for buried insulation
 - a. Flexible laminate consisting of asphalt and glass fabric.
 - b. Fabricated so that it can be wrapped around the insulation and easily secured in place.
 - c. Flexible and tough enough to be wrapped tightly around the insulation and secured without tearing or cracking.
 - 8. Jacketing for above ground insulation
 - a. Standard gauge aluminum jacketing with stainless steel bands.

2.20 PAINTING AND IDENTIFICATION

- A. In accordance with SECTION 09900.

PART 3 EXECUTION

3.01 INSTALLATION

A. General

1. Coordinate work with the other trades, so that interferences between piping, duct, equipment, architectural and structural features, and other work will be avoided.
2. Anchors, bolts, inserts, supports, wall fittings, sleeves and all other appurtenances required to be built in to the work prior to the installation of pipe work shall be furnished and installed accurately and maintained in position during placement of the surrounding concrete and or masonry.
3. Drawing are diagrammatic and do not attempt to show all offsets or fittings. Install piping to conform to structures, equipment, approved shop drawings and fit work of other trades as approved by the Engineer at no additional expense to the Owner.
4. Install piping as closely as possible to walls, ceilings, columns, and other structural parts (consistent with proper space for covering, removal of pipe and access to equipment) so as to occupy the minimum of space, and all offsets and fittings required to accomplish this must be furnished by the Contractor without additional expense to the Owner.
5. In case interference develops, the Engineer will decide which work is to be relocated regardless of which was first installed.

B. Protection Against Settling

1. Where a cast pipe passes through a concrete structure into fill, whether shown or otherwise, there shall be a flexible pipe coupling at or within 12-inches of the concrete face. A second flexible joint (flexible pipe coupling or bell and spigot) shall be provided within 3 feet of the first, whether shown or not.

C. Ductile-Iron Pipe

1. Care shall be taken in handling and installing pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is installed so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.
4. Cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.
5. Castings to be encased in masonry shall be thoroughly cleaned of all rust, scale and other foreign material. Then accurately set with the bolt holes, if any, carefully aligned.
6. Appurtenances shall be set and jointed as indicated on the drawings.
7. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.

8. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.
9. Flanged joints shall be made up tight, care being taken to prevent undue strain upon pump nozzles, valves, and other pieces of equipment.

D. Tapped Connections in Ductile Iron Pipe

1. Tapped connections shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses, shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
2. Where the size of the connections exceeds that given above for the pipe in question, 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 permitted by the Engineer.
3. All drilling and tapping shall be done normal to the longitudinal axis of the pipe; fitting 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.

E. Copper Pipe

1. Joints for piping except where buried shall be made up with 95-5 solder.
2. Joints for supply piping buried or installed below slab shall be made up with at least 1000 degree silver solder, and installed with minimum amount of buried joints.

F. Brass Pipe

1. Install in place of copper pipe when more rigidity is required as stated in article 2.02, B, 7.

G. Black Steel Pipe

1. All threads to be clean, machine cut, and all pipe to be reamed before erection. Each length of pipe as erected shall be up-ended and rapped to dislodge dirt and scale.
2. Screwed joints to be made up with good quality thread compound and 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 the new compound applied. All joints shall be airtight.
3. All interior steel piping to have a sufficient number of unions to allow convenient removal of piping. Install rigid joint and flexible couplings as required.

H. Seamless Carbon Steel

1. Maximum length of pipe to be twenty feet.
2. Joint broken after thread compound has set will be cleaned and new compound applied.
3. Joints to be air tight.
4. Install a sufficient number of unions to allow convenient removal of piping.

I. Stainless Steel Pipe

1. Install in accordance with the manufacturer's technical data and printed instructions.
2. Weld joints except flanged where required or screwed where shown on the Drawing.

J. Polyvinyl Chloride (PVC) Pipe

1. Install in accordance with the manufacturer's technical data and printed instructions.

2. Solvent weld joints except flanged where required or screwed where shown on the Drawing. In making solvent welded connections, clean dirt and moisture from pipe and fittings, bevel pipe ends slightly with emery cloth if necessary, and apply solvent cement of the proper grade.
3. Install expansion joints every 50 feet on straight runs in accordance with the manufacturer's recommendations and Engineers approval. Expansion joints shall be used outside adjacent to the structures. Exterior expansion joints shall be installed within an approved sleeve to keep joint free from dirt.
4. Install valves and fittings in accordance with the manufacturer's instructions. Particular care shall be taken not to overstress threaded connections at sleeves. In making solvent weld connections, the solvent should not be spilled on valves or allowed to run from joints.
5. All compete pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints after which they shall be tested as specified.
6. Where PVC passes through wall sleeves, joints shall be caulked with a sealing element or link type seal as shown on the Contract drawings.
7. Install flexible couplings in accordance with the manufacturer's instructions.

K. Fiberglass Reinforced Plastic (FRP) Pipe

1. Cut, fabricate and install in accordance with the manufacturers written instructions.
2. Provide manufacturer's representative for instructing workers with proper jointing procedures.

3.02 SLEEVE-TYPE COUPLINGS

- A. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches.
- B. Soapy water may be used as a gasket lubricant.
- C. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.
- D. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.
- E. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.
- F. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts.
- G. The correct torque as indicated by a torque wrench shall not exceed the values indicated in the tabulation titled TORQUE.

TORQUE

Nominal pipe size, <u>in.</u>	Bolt diameter, <u>in.</u>	Maximum torque, <u>ft.-lb.</u>
3-24	5/8	75
30-36 (1/2 in. mid ring)	5/8	65

30-36 (3/8 in. mid. ring)	5/8	70
30-48	3/4	80
48-72	3/4	70

3.03 HANGERS AND SUPPORTS

A. In accordance with SECTION 15140.

3.04 TRENCHING AND BACKFILL FOR BURIED PIPELINES

A. In accordance with SECTION 02200.

3.05 CLEANING

A. Prior to the pressure and leakage tests, the piping shall be thoroughly cleaned of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

3.06 TESTING

A. General

1. All piping and piping systems are to be pressure or leak tested by the Contractor in the presence of the Engineer.
2. Leak testing (exfiltration test) shall be performed on all lines designated for gravity service.
3. Pressure testing shall be performed on all lines designed to transfer product under pressure.
4. No leakage will be permitted.
5. Piping not passing pressure or leak testing shall be repaired or replaced by the Contractor and retested to the satisfaction of the Engineer at no additional expense to the Owner and without extension of time for completion of the Work.
6. Furnish and install suitable temporary testing plugs or caps; pressure pumps, pipe connections, meters, gages, relief valves, blow offs and other necessary equipment; and all labor required, to test the pipe specified in this Section.
7. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires with the following exceptions:
 - a. Pipelines embedded in concrete shall be tested prior to placing of the concrete.
 - b. Exposed piping shall be tested prior to field painting.

B. Ductile Iron Pipe

1. Section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary taps at such points and shall plug said holes after completion of the test.
2. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.
3. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the

pipe but not to exceed 200 psi. Care shall be taken not to apply this pressure to items of equipment known to be incapable of withstanding such pressure.

4. If the specified pressure cannot be achieved and maintain it for a period of **one (1) hour with no additional pumping**, the section shall be considered as having failed to pass the test.
5. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirements.

C. Copper Pipe and Carbon Steel Pipe

1. After installation, the piping shall be tested for **one (1) hour at 1.5 times the designed operating pressure**.

D. PVC Pipe

1. Pipe lines shall be subject to a hydrostatic pressure test for **one (1) hour at 1.5 times the designed operating pressure** or as required by the Engineer.

3.07 DISINFECTING AND FLUSHING

A. Pipe lines carrying potable water shall be disinfected

1. Furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651, except as otherwise specified herein.
2. The dosage shall be such as to produce not less than 10 PPM after a contact period of not less than 24 hours.
3. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM.
4. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.
5. Dispose of the water used in disinfecting and flushing in an approved manner.
6. If, in the opinion of the Engineer and/or owner of the above method of disinfection is deemed impractical, the lines carrying potable water shall be disinfected by the method outlined in AWWA Standard C651, Section 9.

END OF SECTION

SECTION 15070

DUCTILE-IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to furnish, install, joint, and test ductile-iron pressure pipe, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.
- B. This Section covers Ductile-Iron Piping not buried in earth.

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. A21.4, Standard for Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water.
 - 2. A21.10, Standard for Gray-Iron and Ductile-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
 - 3. A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
 - 4. A21.15, Standard for Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges
 - 5. A21.50, Standard for Thickness Design of Ductile-Iron Pipe.
 - 6. A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds, or Sand-Lined Molds, for Water or Other Liquids.
 - 7. B16.1, Standard for Ductile Iron Pipe Flanges and Flanged Fittings.
- C. American Water Works Association (AWWA)
 - 1 C606, Standard for Grooved and Shouldered Joints.
 - 2 C651, Standard for Disinfecting Water Mains.
- D. American Society for Testing Materials (ASTM)
 - 1. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.03 SUBMITTALS

- A. In accordance with SECTION 01300 submit the following:
- B. Shop Drawings
 - 1. Piping layouts in full detail.
 - 2. Location of pipe hangers and supports.
 - 3. Location and type of backup block or device to prevent separation.
 - 4. Large scale details of all wall penetrations and special castings.
 - 5. Schedules of all pipe, fittings, special castings, couplings, expansion joints, and other appurtenances.
- C. Certificates

1. Sworn certificates in duplicate of shop tests showing compliance with appropriate standard.
- D. Manufacturer's Literature
1. Catalog cuts of joints, couplings, harnesses, expansion joints, gaskets, fasteners and other accessories.
 2. Brochures and technical data of coatings and lining's and proposed method of application.

1.04 QUALITY ASSURANCE

- A. Inspect and test at foundry according to ANSI Standards.
- B. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.
- C. Owner reserves right to perform visual inspection and hammer test before installation.

PART 2 PRODUCTS

2.01 PIPE

A. Ductile-Iron Pipe

1. Designed in accordance with ANS A21.50.
2. Manufactured in accordance with ANS A21.15 or ANS A21.51.
3. Ductile-iron pipe shall be at least thickness **Class 52** for pipe 4-inch and smaller and at least thickness **Class 53** for pipe 6-inch and larger, unless stated otherwise.
4. Ductile-iron pipe for use with split couplings shall have a thickness as specified in this Section.

B. Pipe For Use With Couplings

1. Pipe for use with sleeve-type couplings shall be as specified above except that the ends shall be plain (without bells or beads). The end shall be cast or machined at right angles to the axis.
2. Pipe for use with split couplings shall be as specified above except that the ends shall not have bells or beads but shall have cast or machined shoulders or grooves conforming to AWWA C606.

2.02 FITTINGS

A. Flanged Fittings

1. Provide with working pressure of 250 psi.
2. Faced and drilled in accordance with ANS A21.10 except that special drilling or tapping shall be provided as necessary to ensure correct alignment and bolting.
3. Flanged fittings which are not available under ANS A21.10 (e.g. laterals or reducing ells) shall be furnished to conform to the requirements of ANS B16.1, class 125.

B. Base Elbows

1. Fittings shall be provided with standard bases in accordance with ANSI/AWWA C110/A21.10 where so indicated.

C. Grooved Fittings

1. In accordance with ANS A21.10 in all respects except minimum wall thickness as follows:

<u>Nominal Pipe size, in.</u>	<u>Minimum wall thickness, in.</u>
3	0.40
4	0.40
6	0.45
8	0.53
10	0.55
12	0.60

D. Nonstandard Fittings

1. Fittings having nonstandard dimensions and cast especially for this project shall be of acceptable design. They shall be manufactured to meet the requirements of the same specifications and shall have the same diameter and thickness as standard fittings, but their laying lengths and types of ends shall be determined by their positions in the pipelines and by the particular piping to which they connect.

2.03 ADAPTERS

- A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the Drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.04 JOINTS

A. Gaskets

1. Gaskets shall be of a composition suitable for exposure to the product which the pipe is intended.

B. Flanges

1. Flanges for flanged pipe shall conform to ANS A21.15 except that special drilling or tapping shall be done as necessary to ensure correct alignment and bolting.

2.05 COUPLINGS

A. Flexible Connections

1. Where flexible connections in the piping are specified or indicated on the drawings, they shall be obtained by the use of sleeve-type couplings or split couplings.

B. Sleeve Type Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.

2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
 - a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
 - a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
4. Nuts and Bolts to be high strength, low alloy steel, unless noted otherwise.
5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
6. Provide with fusion bonded epoxy finish.
7. Conform to requirements of AWWA C219.

C. Split Couplings

1. Split couplings may be used for connecting ductile-iron pipe. If split couplings are used with grooved pipe, the minimum pipe wall thickness shall be as specified under AWWA C606.
2. Split couplings shall be made of malleable iron and shall be NAPPCO couplings made by North American Pipe Products Co.; or acceptable equivalent products.
3. Where split couplings are furnished in lieu of flanged joints the joint shall be of the rigid type with pipe grooves cut to bring the ends of the pipe solidly together. The beam strength of the joint shall be equal to or greater than that of a flanged joint.
4. Where split couplings are indicated to provide for expansion or flexibility, the pipe grooves shall be cut to provide the necessary expansion or flexibility.

D. Dismantling Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
2. For sizes 14 to 72 inch diameter, up to 150 psi working pressure:
 - a. Provide DJ400 Dismantling Joint 14 to 72 inch with tie rods by Romac Industries, inc. Bothell, Washington, or acceptable equivalent products.
3. Coupling shall meet the specifications set forth in the AWWA Standard C219.
4. Flanged spool shall be AWWA Class D Steel Ring Flanges, compatible with ANSI Class 125 bolt circles.
5. The end ring body shall be made from ASTM A36 Steel.
6. Gaskets shall be compounded for water and sewer service. Meeting the requirements of ASTM D 2000.
7. Bolts shall be stainless steel Type 316.
8. Tie rods shall be stainless steel Type 316.
9. Provide with fusion bonded epoxy, NSF 61 certified.

2.06 Accessories

A. Filling Rings

1. Provide suitable filling rings where the layout of the flanged piping is such as to necessitate their use. In materials, workmanship, facing, and drilling, such rings shall conform to ANSI Class 125 standard.

2. Filling rings shall be of suitable length with nonparallel faces and corresponding drilling, if necessary, to ensure correct assembly of the adjoining piping or equipment.
- B. Gaskets, Bolts, And Nuts
1. For flanged joints, gaskets shall be ring gaskets of rubber with cloth insertion. Gaskets 12-inch diameter and smaller shall be 1/16-inch thick; larger than 12-inch, to be 1/8-inch thick.
 2. Flanged joints shall be made with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same American National Standard as the flanges.
 3. Bolts and nuts shall, except as otherwise specified or noted on the drawings, be Grade B conforming to ASTM, A307.
 4. Bolt studs and studs shall be of the same quality as machine bolts.
 5. Submerged flanged joints shall be made up with Type 316 stainless steel stud bolts and nuts.
- C. Tapped Connections
1. Tapped connections in pipe and fittings shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses, shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
 2. Where the size of the connections 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 a 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 permitted by the Engineer.
 3. All drilling and tapping of cast-iron pipe shall be done normal to the longitudinal axis of the pipe; fitting 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. Wall Castings
1. Wall castings shall be of the sizes and types indicated on the drawings. Flanges, facing and drilling shall conform to ANS A21.10 except that where required, as where a flange is substantially flush with the face of a masonry wall, flanges shall be drilled and tapped for studs. Other dimensions shall be substantially equal to corresponding parts of standard fittings. A central fin not less than 1/2-inch thick and 1-1/2-inch to 2-inch high shall be cast on the barrel at a point that will locate it midway through the wall to form a water stop.

2.07 FINISHES

A. Lining

1. Inside of pipe and fittings shall be coated with double thickness cement lining and bituminous seal coat conforming to AN A21.4. The standard bituminous coating is specified under the appropriate AN Standard for the pipe and fittings.

B. Coating

1. The outside of pipe and fittings within structures shall not be coated with the

bituminous coating, but shall be thoroughly cleaned and given one shop coat of Intertol Rustinhibitive Primer 621 made by Koppers Co., Inc., Pittsburgh, Pa.; Multiprime made by PPG Industries, Inc., Pittsburgh, Pa.; Chromox 13R50 Primer made by Mobil Chemical Co., Edison, NJ; or an acceptable equivalent product.

2. Outside surfaces of castings to be encased in concrete shall not be coated.
3. Machined surfaces shall be cleaned and coated with a suitable rust-preventative coating at the shop immediately after being machined.

PART 3 EXECUTION

3.01 HANDLING

A. Pipe and Fittings

1. Care shall be taken in handling and installing pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is installed so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches from the visible limits of the crack.

3.02 CUTTING

A. Pipe

1. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.

3.03 INSTALLATION

A. Pipe and Fittings

1. No defective pipe or fittings shall be installed or placed in the Work, and any piece discovered to be defective after having been installed or placed shall be removed and replaced by a sound and satisfactory piece.
2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be installed accurately to the lines and elevations indicated on the drawings or required. Care shall be taken to ensure a good alignment both horizontally and vertically.

B. Castings

1. Castings to be encased in masonry shall be accurately set with the bolt holes, if any, carefully aligned.
2. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.

C. Appurtenances

1. All valves, fittings and appurtenances shall be set and jointed as indicated on the drawings.

3.04 ASSEMBLING

A. Bolted Joints

1. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.
2. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.

B. Flanged Joints

1. Flanged joints shall be made up tight, care being taken to prevent undue strain upon pump nozzles, valves, and other pieces of equipment.

C. Sleeve-Type Couplings

1. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches.
2. Soapy water may be used as a gasket lubricant.
3. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.
4. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.
5. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.
6. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts.
7. The correct torque as indicated by a torque wrench shall not exceed the values indicated in the tabulation titled TORQUE.

TORQUE

<u>Nominal pipe size, in.</u>	<u>Bolt diameter, in.</u>	<u>Maximum torque, ft.-lb.</u>
3-24	5/8	75
30-36 (1/2 in. mid ring)	5/8	65
30-36 (3/8 in. mid. ring)	5/8	70
30-48	3/4	80
48-72	3/4	70

3.06 PIPING SUPPORT

- A. The Contractor shall furnish and install all supports necessary to hold the piping and appurtenances in a firm, substantial manner (as determined and/or directed by the Engineer) at the lines and grades indicated on the drawings or specified. The design and fabrication of such supports shall be the responsibility of the Contractor as part of the work.

- B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification from the manufacturer stating that such requirements have been complied with.
- C. Piping within buildings and structures shall be adequately supported from floors, walls, ceilings and beams. Supports from the floor shall be by approved saddle stands or suitable concrete or brick piers as indicated or approved by the Engineer. Pipe saddles shall be shaped to fit the pipe with which they will be used and shall be capable of screw adjustment. Concrete piers shall conform accurately to the bottom one-third to one-half of the pipe. Piping along walls shall be supported by approved wall brackets with attached pipe rolls or saddles or by wall brackets with adjustable hanger rods. For piping supported from the ceiling, approved rod hangers of a type capable of screw adjustment after erection of the piping and with suitable adjustable concrete inserts or beam clamps shall be used.

3.07 CLEANING

- A. Prior to the pressure and leakage tests, the piping shall be thoroughly cleaned of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

3.08 PRESSURE AND LEAKAGE TESTS

- A. Except as otherwise directed, all pipelines shall be given combined pressure and leakage tests in sections of approved length.
- B. The Contractor shall furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gages, relief valves, and other necessary equipment; and all labor required, to test the pipe specified in this Section.
- C. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires.
- D. However, pipelines embedded in concrete shall be tested prior to placing of the concrete and exposed piping shall be tested prior to field painting.
- E. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary taps at such points and shall plug said holes after completion of the test.
- F. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.
- G. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe but not to exceed 200 psi. Care shall be taken not to apply this pressure to items of equipment known to be incapable of withstanding such pressure.

- H. If the Contractor cannot achieve the specified pressure and maintain it for a period of one hour with no additional pumping, the section shall be considered as having failed to pass the test.
- I. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test and is considered acceptable by the Engineer.
- J. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirements.

3.09 DISINFECTING AND FLUSHING

- A. The Contractor shall disinfect the lines carrying potable water.
- B. The Contractor shall furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651, except as otherwise specified herein.
- C. The dosage shall be such as to produce not less than 10 PPM. after a contact period of not less than 24 hours.
- D. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM.
- E. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.
- F. The Contractor shall dispose of the water used in disinfecting and flushing in an approved manner.
- G. If, in the opinion of the Engineer and/or owner of the above method of disinfection is deemed impractical, the lines carrying potable water shall be disinfected by the method outlined in AWWA Standard C651, Section 9.

3.10 PAINTING

- A. The shop coats to be given pipe and fittings are specified under article 2.06 FINISHES.
- B. Field painting is Specified in SECTION 09900 - FIELD PAINTING.

END OF SECTION

SECTION 15100

VALVES, GATES, HYDRANTS AND APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and installing valves, gates, hydrants, and miscellaneous piping appurtenances, as indicated on the Drawings and as specified.
2. The Drawings and Specifications direct attention to certain features of the equipment, but may not cover all the details of their design. The equipment furnished shall be designed and constructed equal to the high quality equipment manufactured by such firms as mentioned, or as permitted by the Engineer. The Contractor shall furnish and install the equipment complete in all details and ready for operation.

B. Related Work

1. Section 09900 - Painting

1.02 DESIGN REQUIREMENTS

- ###### A. Enclosures shall be suitable for the atmosphere in which they are installed.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
2. A536, Standard Specification for Ductile Iron Castings
3. B62, Standard Specification for Composition Bronze or Ounce Metal Castings

B. American Water Works Association (AWWA)/American National Standards Institute (ANSI)

1. ANSI/AWWA C110/A21.10, Standard for Ductile Iron & Gray-Iron Fittings 3 in through 48 in for Water and Other Liquids
2. ANSI/AWWA C111/C21.11, Standard for Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings
3. ANSI/AWWA C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
4. ANSI/AWWA C504, Rubber-Sealed Butterfly Valves
5. ANSI/AWWA C509, Resilient-Seated Gate Valves for Water-Supply Service
6. ANSI/AWWA C515, Reduced-Wall, Resilient-Seated Gate Valves for Water-Supply Service
7. ANSI/AWWA C517, Resilient-Seated Cast-Iron Eccentric Plug Valves
8. ASME/ANSI B16.1/B16.5, Cast Iron Pipe Flanges and Flanged Fittings/ Pipe Flanges and Flanged Fittings
9. AWWA C550, Protective Epoxy Interior Coatings for Valves and Hydrants
10. AWWA C606, Grooved and Shouldered Joints

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Submittals

1. Manufacturer's specifications, catalog data, descriptive matter, illustrations, diagrams etc.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- #### A. All gate, globe, angle, and check valves shall be the product of one manufacturer.

2.02 GATE VALVES

A. Valves smaller than 2-inches.

1. 200 lb. WOG minimum bronze valves with screwed ends to suit the piping in which they are installed.
2. Body material shall conform to ASTM B62.
3. Valves shall have union bonnet, rising stem, inside screw, and solid wedge gate.

B. Valves 2-inches and larger.

1. Iron-body, resilient-wedge or double disk as specified.
2. Mechanical joint or flanged ends as indicated on the Drawings or herein specified.
3. All valves shall be designed for a minimum of 250 psi working pressure.
4. Face-to-face dimensions of flanged valves shall conform to the ANS B16.10.
5. Stem material shall be silicon bronze or an acceptable equivalent having high resistance to dezincification.
6. All exposed nuts, bolts and washers shall be stainless steel.
7. Valves shall be capable of being repacked under line pressure.
8. Sewer Valves shall be turned to the **left (counterclockwise)** to open
9. Water Valves shall be turned to the **right (clockwise)]** to open.
10. Coatings
 - a. Exterior and interior surfaces of all valves shall be coated by the valve manufacturer prior to shipment.
 - b. The coating shall be applied and cured in strict conformance with the coating manufacturer's cautions and instructions.
 - c. The coating shall be applied by the valve manufacturer under controlled factory conditions, and field application is strictly prohibited.
 - d. The coating shall be a fusion bonded epoxy-protective coating system which meet all requirements of AWWA C550.

C. Process Valves

1. In accordance with AWWA Specification C-500.
2. Iron body, bronze trim, **[solid wedge with tapered seat or double revolving disc, parallel seat]** construction.
3. If of the parallel seat type, the discs and wedges shall be free of pockets and rib.

D. Potable Water Valves 4-inches through 12-inches

1. Gate valves shall be resilient seated wedge type in accordance with AWWA [**C509 or C515**].
 2. Valve bodies to be of ductile iron.
 3. All valves shall be allowed replacement of upper “O” rings while the valve is under pressure in a fully-opened position.
 4. Valves shall have a two-inch operating nut or hand-wheel as required for the particular application and as shown on the Drawings.
 5. Coating
 - a. The AWWA C550 epoxy coating shall not impart taste or odors to the water. The coating shall be a product acceptable to the NSF for use in potable water and shall be so listed in the most current NSF summary of approved products (ANSI/NSF Standard 61).
- E. Valves greater than 12-inches.
1. Shall meet the requirements of AWWA [**C500 or C509, or C515**] as indicated on the Drawings and meet requirements of the applicable sections of this specification.
- F. Buried/Exterior Valves
1. O-ring seals at stuffing box and bonnet to body flanges
 2. Mechanical joint ends.
 3. Non rising stem, inside-screw, two (2) inch operating nut and suitable coupling to connect to valve stem.
 4. Suitable for buried service.
 5. Operating wrench.
- G. Interior Valves
1. Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.
 2. O.S. & Y. except where N.R.S. is called for, and have a packing seal.
 3. Flanged unless otherwise shown on the Drawings.
 4. Flanges shall be drilled to the ANSI 125/150 pound standard.
- H. Actuators
1. Means of actuation by wheel, lever, tee wrench, gear actuator or motorized actuator, as specified or as indicated on the Drawings.
 2. Interior Gate Valves
 - a. Hand-wheel operated.
 - b. Hand wheels shall be of ample size for ease of operation and shall have an arrow and the work OPEN cast thereon to indicate the direction of opening.
 - c. Chain operator for valves with operating stem height six (6) feet above finished floor.
 - d. Supply actuators to operate valve as required.
 3. Buried/Exterior Valves
 - a. Provide extension stem with two-inch operating nut, to terminate 18 inches below finish grade.
 - b. Provide valve boxes.
 - c. All buried valves shall be equipped with the specified actuator and shall be suitable for buried service.
 4. Valves 12 inches and larger
 - a. Equip with gear actuators.
 - b. Actuator gear box shall be of totally enclosed oil or grease bath lubricated type, suitable for operation at any angle and provided with the appropriate filling and drain plugs.

- c. Shaft bearings furnished with permanently lubricated bronze bearing bushings.
 - d. Actuator shall clearly indicate valve position and an adjustable stop shall be provided.
 - e. Construction of actuator housing shall be semi-steel with exposed nuts, bolts, and washers to be zinc plated.
 - f. All valve actuators shall be as recommended by the valve manufacturer.
5. Valves shall be manufactured by American Flow Control, Birmingham, AL; Kennedy Valve, Elmira, N.Y. or acceptable equivalent.

2.03 CHECK VALVES

A. Check valves 3 inches and larger

- 1. Iron-body, bronze-mounted, full-opening, swing-type check valves with bolted covers and flanged ends.
- 2. Flanges shall be faced and drilled in accordance with the 125-lb. AN Standard.
- 3. Valves shall have bronze faced cast iron disc plate suspended at the top from a stainless steel shaft.
- 4. Valve shaft shall be supported by bronze bushings and bearings and shall be packed through externally accessible stuffing box.
- 5. Disc shall seat against resilient seat installed in the valve body.
- 6. Valve closure shall be assured by means of outside lever and weight.
- 7. Shop primed on the outside with a rust inhibitive priming system.

B. Check valves smaller than 3-inches

- 1. 300 pounds bronze curving design with screwed-in bonnet, regrinding bronze disc, and screwed ends.
- 2. Disc shall be suspended at the top with a stainless steel shaft.
- 3. All check valves shall be horizontally mounted.

2.04 PLUG VALVES

A. General

- 1. Valves shall be in full conformance to AWWA C517.
- 2. Nonlubricated eccentric type with resilient faced plugs for service in sewage and sludge piping.
- 3. Valves shall provide bi-directional sealing at 175 psi differential in sizes up to 12 inches and 150 psi differential for sizes 14 inches and larger.
- 4. Valve seating shall provide a consistent opening/closing torque that is not dependent on adjustment of stop. Resilient seating shall be field replaceable on the existing plug.
- 5. Valves shall be of the bolted bonnet, top entry design, capable of repacking without removing the bonnet or valve from the pipe line.
- 6. All exposed nuts, bolts and washers shall be stainless steel.
- 7. Valves shall be DeZurik Model PEF Eccentric Plug Valves, or approved equal. All valves furnished shall be by the same manufacturer.
- 8. Valves shall open Left

B. End Connections

- 1. Flanged ends to be in full compliance with ANSI B16.1-125 lb. /ANSI B16.5 - 150 lb standards including facing, drilling and thickness.
- 2. Mechanical Joint ends to be in accordance with AWWA C111.

3. Grooved ends to be in accordance with AWWA C606.
 4. Screwed ends to be NPT Standard.
- C. Port areas
1. Unobstructed when open and have smoothly shaped waterways of not less than 100 percent of full pipe area.
- D. Valve body
1. Cast iron conforming to ASTM A-126 Class B.
- E. Plug
1. ASTM A536, shall be solid, one piece ductile iron with cylindrical seating surface eccentrically offset from the center of the shaft. The plug shall be resilient faced with neoprene, or other resilient material suitable for use with sewage.
 2. Bearing to be sleeve type, stainless steel and be isolated from solid particulates.
- F. Coatings
1. All surfaces are to be protected, both internally and externally, with a factory coated heat fused thermoset epoxy or thermoplastic nylon complying fully with AWWA Standard C-550.
 2. Epoxy coatings are also acceptable.
- G. Actuators
1. Valves larger than eight inches.
 - a. Provided with manual gear operators having a maximum rim pull of 80 pounds as per AWWA C-504.
 - 1) Gear operators shall be enclosed and provided with seals on all shafts to prevent entry of water, allow submerging of the operator and suitable for running the gears in oil.
 - 2) All shaft bearings shall be furnished with permanently lubricated bronze bearing bushings. Adjustable stops shall be provided.
 - b. Provide with hand wheels.
 2. Valves above six feet from the finish floor or in inaccessible locations.
 - 1) Operated by a chain operator and chain wheel provided by the valve manufacturer to operate that particular valve.
 3. Valves eight inches and smaller located within six feet six inches of the finished floor in accessible locations.
 - 1) Operated by a portable lever.
 - 2) One portable level shall be provided for 50 percent of the valves or 15 portable levers whichever is less.
 4. Valves in inaccessible locations shall be operated by extension stem, stem guides, 2-inch operating nut with mounting bracket or floor box, or floor stand, and lever or hand wheel as appropriate.
 5. The plug valve manufacturer shall provide all operator accessories as required to make each operator system completely operational.
 6. Extension stem, stem guides and 2-inch operating nut as manufactured by Penn-Troy Manufacturing of Troy, PA, Kennedy Valve, Elmira, N.Y. or acceptable equivalent.
 7. Buried or submerged service valves

- 1) Seals on all shafts and gaskets on the valve and actuator covers shall prevent the entry of water.
 - 2) Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals.
 - 3) All exposed nuts, bolts, springs and washers used in buried service shall be stainless steel.
8. Actuator shall clearly indicate valve position.

2.05 BALL VALVES

A. General

1. Straight-through passageway, and shall be of the full-port design.
2. Rated for 150-psi service.

B. Construction

1. Type 316 stainless steel, except for those valves specified PVC construction or installed in PVC piping.
2. Body shall be of rigid construction and symmetrically cast.
3. The shaft and ball shall be integrally cast.
4. Seats and seals shall be Teflon and shall be recessed in a machined groove.
5. Shaft packing
 - a. Braided band.
 - b. Tightened by means of a gland bearing strip.
 - c. Replacement of the packing shall be accomplished without removing the actuator.

C. Valves shall be by Apollo or equal.

2.06 PVC VALVES

A. General

1. Polyvinyl Chloride (PVC) valves shall be manufactured of the same PVC Type 1 Grade 1 molding compound used for the fittings to assure proper compatibility of system components.

B. Ball valves and ball check valves

1. True union PVC valves.
2. Design to allow for entire valve body removal by turning back the union nut at both ends of the valve.
3. Teflon seats and packing.
4. Pressure rating of 150 psi at 75 degrees F water.

C. Diaphragm Valves

1. Constructed of PVC, except diaphragm, including bonnet and hand wheel.
2. Diaphragm shall be replaceable and fully supported in any position.
3. Non-rising stem with a diaphragm position indicator.
4. Diaphragm constructed of Teflon and be replaceable without removing valve from the line.
5. Valve shall be socket ends.
6. Valves shall be by Nibco or equal.

- D. The valves shall be pneumatically or manually operated as shown on the drawings. Valve operators shall be supplied as specified under the valve operation Section 2.10.

2.07 VALVE OPERATORS

- A. Valve operators shall be designed in accordance with the requirements of AWWA Specifications, C504-80 and shall furnish sufficient torque to open and close at 125 percent of the rated working pressure for the valve.
- B. Valves 6 inches and larger shall be gear operated with hand wheels and valves smaller than 6-inches shall be wrench operated, except as hereinafter specified or indicated on the Drawings.
- C. Where there is a lack of space for the valve wrench to operate gear-operators, hand wheels shall be provided in lieu of the wrench.
- D. Chain operators, consisting of sprocket wheels, chain guides and operating chains shall be provided for all valves with operator centerlines located more than 6 feet - 6 inches above the operating level. Operating chain shall be galvanized and shall extend within 3 feet of the operating level. Operators shall develop their maximum capacity with not greater than a 40-lb. pull on the wheel.
- E. Gear operators shall be totally enclosed, worm-gear type, permanently lubricated, and shall be watertight and dust tight.
- F. Gear operators shall be provided with adjustable stops for the open and closed position to prevent over travel, and shall have a valve disk position indicator.
- G. A suitable lever or wrench shall be provided for each six wrench-operated valves and at least one wrench for each operating station. Wrenches or wheels and chains shall be of suitable size and sufficient length for easy operation of the valves at their rated working pressure.
- H. The valve assembly including valve and operator shall be tested to requirements specified herein at the valve manufacturer's factory.

2.08 CHAIN OPERATORS

- A. Valve hand wheel centerlines located more than 6 feet above the floor or operating platforms shall be considered as being inaccessible and shall be provided with chain operators.
- B. Chain wheels and chains shall be provided by the valve manufacturer to operate the particular valve.
- C. Where indicated on the drawings or inaccessible due to size or location, valves shall be provided with chain operators and, where required, angle drives with chains extending to within 3 feet of the floor or operating platform.
- D. Chains shall be galvanized.
- E. Sprocket wheels shall be provided with chain guides.

2.09 TELESCOPING VALVE ASSEMBLIES

A. General

1. Sized to fit riser pipe and penetrate the riser pipe a minimum of 9" in the up position.
2. Unit shall be guaranteed against defects in material and workmanship for a period of three (3) years.

B. Construction

1. The unit shall have a floor stand of 4" square stainless steel tube with 1/8" wall and mounted to 1/2" thick stainless steel base plate.
2. The hand wheel shall be 16" diameter cast aluminum and work in conjunction with a 1 inch square stainless steel rack, 2 inch stainless steel spur gear and oil-impregnated sintered bronze bushings, requiring a maximum of 2 turns for one foot of travel.
3. The sliptube shall be a minimum of 16 ga. stainless steel and incorporate a 150 lbs. stainless steel companion flange and 1/4" thick Neoprene wipe gasket.

C. Provide Series V4R manufactured by Halliday Products, Inc. of Orlando, Florida

2.10 VALVE EXTENSION STEMS

A. General

1. Furnish as required and as shown on the Drawings.
2. Shaft lengths shall suit the particular installation.
3. All exterior valves shall be provided with valve extension stems and valve boxes.
4. Stems shall have a two-inch operating nut and a two-inch coupling for connection of the valves.
5. All operating nuts shall be located 18 inches below finished grade.

2.11 T-HANDLE OPERATING WRENCH

- ### A. Provide in the number and lengths to operate buried valves by workers of average height working in normal position.

2.12 SOLENOID VALVES

A. General

1. Direct acting packless two-way solenoid valve for water service.
2. Normally closed, unless otherwise shown.
3. Provide for operation with 120 volt, 60 Hertz power and have continuous duty Class A insulation.
4. Valve body to be forged brass with safe body working pressure of at least 250 psi.
5. NPT connections unless indicated otherwise.
6. Buna-N seat.
7. Wetted parts to be stainless steel.

B. Valves shall operate satisfactorily when mounted in any position.

C. Valves shall be by ASCO or equal.

- D. Provide [general purpose enclosure.] [enclosures to meet NEMA Type 4X requirements with coils epoxy encapsulated and suitable for high ambient temperatures (140 degrees F).]**

2.13 AIR RELEASE VALVES

A. General

1. Allow for the admission or release of large quantities of air during the fill up or drainage of pipelines and shall be specially designed for use with raw sewage.
2. The valve shall open when the operating pressure falls below atmospheric pressure, and shall close and remain closed when the operating pressure is above atmospheric pressure.

B. Construction

1. Valves shall consist of a compact tubular all stainless steel fabricated body.
2. HDPE hollow direct acting float.
3. HDPE solid large orifice float.
4. Stainless steel nozzle and woven dirt inhibitor screen.
5. Nitrile rubber seals and natural rubber seat.
6. Integral anti-surge orifice mechanism which shall operate automatically to limit surge pressures rise or shock induced by closure to less than 2 times the valve rated working pressure.
7. The intake orifice area shall be equal to the nominal size of the valve i.e., a 6" valve shall have a 6" intake orifice.
8. Large orifice sealing shall be by the flat face of the control float seating against a nitrile rubber O-ring housed in a dovetail groove circumferentially surrounding the orifice.
9. The seating & unseating of a small orifice nozzle on a natural rubber seal affixed into the control float shall control discharge of pressurized air. The nozzle shall have a flat seating land surrounding the orifice so that damage to the rubber seal is prevented.
10. The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure.

C. Connections

1. Flanged ends conforming ANSI B16.1 Class 125.
2. Flanged ends shall be supplied with type 316 stainless steel screwed studs inserted for alignment to the specified standard.
3. Provide type 316 stainless steel nuts and washers.

- D. Air and vacuum valves shall be Series RGX by Vent-O-Mat© and sized as indicated on the Drawings.

2.14 PRESSURE REDUCING VALVES (LARGER THAN TWO INCH)

A. General

1. Flanged globe body, bronze mounted, external pilot operated with a free floating piston and shall operate without springs, diaphragms or levers.
2. Single seat with the seat bore equal to the size of the valve.
3. Piston travel shall be a minimum of 25 percent of the seat diameter. The piston shall be guided above and below the seat no less than a length equal to 75 percent of the seat diameter. The piston shall be cushioned and designed to insure positive closure.

4. The valve shall be suitable for 150 pound flanged service and shall conform to AWWA standards for flange thickness, drilling and the wall thickness of the body and caps. The valve body shall be constructed of gray iron, free from cold shuts and defects and having a minimum tensile strength of 35,000 psi.
5. The valve shall be hydrostatically tested at a minimum of two times the rated service pressure. All iron castings shall be coated on all surfaces with two coats of asphaltic base metal paint.

B. Construction

1. Packed with leather and shall be furnished with an indicator rod to show the piston position.
2. Gauge petcocks shall be furnished on the valve body.
3. The pilot valve
 - a. Easily accessible and shall be removable from the main valve under pressure.
 - b. Adjustable without special tools or the removal of springs or weights.
4. The main valve shall be designed to facilitate repairs internally without removing the valve from the line.
5. The valve shall be designed to maintain a preadjusted downstream pressure for varying rates of flow by piston positioning without water hammer.

2.15 PRESSURE REDUCING VALVES (TWO INCHES AND SMALLER)

A. General

1. Single seated balanced design type globe body with threaded inlet and outlet ports.
2. Valves shall be diaphragm operated, spring loaded, and permitting convenient adjustment.

B. Construction

1. The body shall be of bronze construction with stainless steel stem.
2. Furnished with a replaceable rubber seat.

C. Valves shall be G-A Industries Figure 43-D, Watts No. 223, or equal.

2.16 PRESSURE RELIEF VALVE

A. Construction

1. Cast iron frame and cover with a bronze body ring and rubber flap ring.
2. Hinge pin shall be bronze and secured with cotter pins.
3. Valve shall have two pivot points and shall have a flanged end.

B. No leakage shall occur on a valve with at least 18 inches of water cover above the installed valve.

2.17 VALVE BOXES

A. General

1. Each buried stop and valve shall be provided with a suitable valve box.

B. Construction

1. Adjustable, telescoping, heavy-pattern type with the lower and the upper part of cast iron.
 2. Designed and constructed as to prevent the direct transmission of traffic loads to the pipe or valve.
 3. The upper or sliding section of the box shall be provided with a flange having sufficient bearing area to prevent undue settlement.
 4. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and rest on the valve bonnet.
 5. Adjustable through at least 6 inches vertically without reduction of the lap between sections to less than 4 inches.
 6. The inside diameter of boxes for valves shall be at least 4-1/2 inches, and the lengths shall be as necessary for the depths of the valves or stops with which the boxes are to be used.
 7. Covers
 - a. Cast iron close fitting and substantially dirt-tight.
 - b. The top of the cover shall be flush with the top of the box rim.
 - c. An arrow and the word OPEN to indicate the direction of turning to open the valve shall be cast in the top of the valve covers.
 - or**
 - d. Letters to indicate the service similar to "WATER" or "SEWER" shall be cast in the top of the valve covers as appropriate.
- C. Boxes for curb stops shall be threaded internally to fit the threads on the bonnet of the curb stop.

2.18 FIRE HYDRANTS

A. General

1. Designed for 175 psi working pressure.
2. Conform to the latest specifications for hydrants by the AWWA.
3. Listed by Underwriters Laboratories, Inc. and Factory Mutual Research.

B. Construction

1. Provide with **two 2 ½ inch hose nozzles and one 4 ½ inch pumper nozzle**, unless required otherwise by the Owner.
2. Inlet connections to be mechanical joint.
3. Provide one operating wrench with each hydrant.
4. Drainage wells of 1/2 cubic yard capacity of two-inch crushed stone shall be placed in the excavation below the hydrant bottom.
5. Concrete thrust block shall be used to back up the hydrant and in no way shall block the hydrant drains.
6. Painting shall be in accordance with Specification Section 09900 – Painting, colors to match Owners standard.

- C. Provide model Modern Centurion® as manufactured by Mueller Company, Decatur, IL or equal.

2.19 HOSE BIBS

A. General

1. 3/4 inch bronze gate valve with a 3/4 inch NPT discharge connection.

2. A cap and chain shall be supplied for the outlet.
3. Provide Model 372 as made by Jenkins or similar models from Lunkenheimer or Crane or equal.

2.20 QUICK DISCONNECT COUPLINGS

A. General

1. Couplings and adapters shall be furnished in the quantities, types and sizes as shown on the Drawings or specified herein.
2. The couplings and adapters shall be designed for a working pressure of 200 psig.
3. Couplings and adapters shall be of **[aluminum] [stainless steel]** and shall utilize a cam-type mechanism for connecting the coupler and adapter pieces to provide a leak proof connection.
4. No springs, ball bearings or snaps shall be used to make the connection.
5. The couplings shall be fitted with Buna-N gaskets recessed into the coupling to prevent the gasket from falling out.
6. The disengagement handle pins shall be of stainless steel and stainless steel rings shall be furnished on the handles.

2.21 POLYVINYL CHLORIDE TUBING (FLEXIBLE PVC)

A. Construction

1. Nylon braiding incorporated within the walls of the tubing.
2. The nylon braiding shall be completely protected by a smooth outside covering of PVC, thus shielding the mesh from conditions detrimental to exterior mesh tubing.
3. The tubing shall have a working temperature of minus five degrees F to 175 degrees F.

2.22 VALVE TAGS

A. General

1. 1 ½ inch, square, brass.
2. Stamped ½ inch characters to be black filled.
3. Numbered to owners identification system, if no system is required then number sequentially.
4. Provide each tag with No. 16 brass jack chain in suitable length to attach tag to valve.

2.23 TAPPING SLEEVE AND VALVE

Note to Specifier, this spec is for a ductile iron body. Other less expensive models are available.

A. General

1. Tapping sleeves, including outlet flanges shall be as dimensioned and thicknesses shall be as required by ANSI/AWWA C110/A21.10.
2. Designed to withstand working pressure of at least 200 PSI.
3. Furnish with tee head bolts and gaskets conforming with ANSI/AWWA C111/A21.11
4. Conform to the latest specifications adopted by the AWWA and be of the specific size to suit the existing conditions.

B. Construction

1. Mechanical joint, two part castings flanged on the vertical centerline, and come complete with all joint accessories.
2. The surface area of each flange shall be thoroughly machined, and the tapping sleeve flanges shall be fitted with gaskets.
3. Each gasket shall cover the entire surface area of each joint for the full length of the tapping sleeve.
4. Bolts used to assemble the tapping sleeves shall pass directly through each flange and through each gasket and be properly spaced to insure uniform gasket pressure and compression.
5. Tapping sleeve outlets shall have counter bored flange to insure proper centering of the tapping valve.
6. Tapping sleeve and valve assembly to satisfactorily pass air test prior to coring main.
7. All tapping valves shall be flanged by mechanical joint.
8. Tapping valves shall conform to the specifications for gate valves (Potable Water Valves).

PART 3 EXECUTION

3.01 GENERAL

- A. Valves shall be installed as nearly as possible in the positions indicated on the drawings consistent with conveniences of operating the hand wheel or wrench. All valves shall be carefully erected and supported in their respective position free from all distortion and strain in appurtenances during handling and installation. All material shall be carefully inspected for defects in workmanship and material, all debris and foreign material cleaned out of valve openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.
- B. Valves shall not be installed with stems below the horizontal.
- C. Valves shall be set plumb and supported adequately in conformance with the instructions of the manufacturer. Valves mounted on the face of concrete shall be shimmed vertically and grouted in place. Valves in the control piping shall be installed so as to be easily accessible.
- D. Where chain wheels are provided for remote operation of valves two S-shaped hooks shall be provided for each valve to enable the chains to be hooked so as not to interfere with personnel traffic.
- E. Valves shall be provided with extension stems where required for convenience of operation. Extension stems shall be provided for valves installed underground so that operating nuts are located 18 inches below finished grade and elsewhere so that the operating wrench does not exceed 8 feet in length.
- F. A permanent type gasket of uniform thickness shall be provided between flanges of valves and sluice gates and their wall thimble.
- G. Wall thimbles shall be accurately set in the concrete walls so that the gates can be mounted in their respective positions without distortion or strain.

3.02 PLUG VALVES

- A. Plug valves in horizontal sewage and sludge piping shall be installed with the shaft horizontal such that when in the open position, the plug is located in the upper part of the valve body. Valves shall be oriented so that in the closed position, the plug is at the upstream end of the valve.

3.03 VALVE TAGS

- A. Tag valve in visible location, free from interference with operating device, other equipment and personnel.
- B. Develop and provide to Owner, valve chart indicating all valves with corresponding identification number.

3.04 SUPPORTS FOR TERMINAL CLEAN-OUT PIPING

- A. Support to maintain required pitch, prevent vibration, and provide for expansion and contraction.

3.05 FIRE HYDRANTS

- A. Fire hydrants and appurtenances shall be installed in accordance with the local municipal fire codes.

3.06 PAINTING

- A. Shop and Field Painting shall be as specified under SECTION 09900.

END OF SECTION

SECTION 15130

GAUGES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements to furnish and install gauges at locations indicated on the Drawings and as specified.

PART 2 PRODUCTS

2.01 GENERAL

- A. Gauges include pressure, vacuum and compound gauges of the dial indicating Bourdon tube-type.
- B. Gauges shall be Helicoid Gauges as manufactured by the American Chain and Cable Co., Ashcroft Duragauges by Manning, Maxwell and Moore, Inc., or approved equal.
- C. Pressure gauges shall be designed to indicate pressures above atmospheric pressure only.
- D. Vacuum gauges shall be designed to indicate pressures below atmospheric pressure only.
- E. Compound gauges shall be designed to indicate pressures above and below atmospheric pressure.

2.02 LOCATION

- A. Gauges shall be provided where shown on the Drawings, specified in the Specifications or required for a complete installation. Indicating pressure gauges shall be provided downstream of each pressure regulating valve where shown, specified or required; in the seal water piping of each pump; and on both the suction and discharge piping of each pump except where otherwise specified.

2.03 ACCURACY

- A. Grades of accuracy shall conform to the requirements of American Standard A.S.A. B40.1. The Contractor shall submit manufacturer's certifications indicating that the gauges provided have met the accuracy requirements specified.
- B. Pressure, vacuum and compound gauges shall be Grade AA gauges with an error not exceeding $\frac{1}{2}$ of 1 percent of full-scale range.
- C. Gauges with a flexible seal between the Bourdon tube and the medium to be measured shall have an overall accuracy of Grade A with an error not exceeding one percent of scale range for the middle half and 1-1/2 percent for the remainder of the scale.

2.04 GAUGE CONSTRUCTION

- A. Gauges shall be weatherproof, designed and constructed to meet all requirements for satisfactory operation.
- B. Pressure, vacuum and compound gauges shall be constructed of sound, durable material, free from all defects and imperfections that in any way may affect the accuracy and serviceability of the gauges.
- C. Gauge cases shall be of aluminum, phenolic or polypropylene. Dial shall be 4 1/2 inches nominal diameter with black lettering and scales on a white background, and shall bear a legend showing service and units of graduation. Gauge dial shall be clear and blemish free and sealed to prevent entrance of moist air. Bourdon tube shall be phosphor bronze with forged brass socket. Set point shall be of stainless steel. Socket stem shall extend at least 1-1/4 inches below the gauge case and shall have a large wrench flat.
- D. Pressure gauges shall be graduated in psi unless otherwise specified. Vacuum gauges shall be graduated in inches of mercury; compound gauges shall be graduated in inches of mercury, psi or feet of water as specified.
- E. Maximum scale reading for pressure and compound gauges shall be approximately twice the maximum operating pressure of the fluid to be measured. Vacuum and compound gauges shall have minimum scale readings at 30 inches of mercury unless otherwise shown or specified.
- F. Unless otherwise shown or specified, all pressure, vacuum and compound gauges shall have bottom 1/2-inch NPT male connections.

2.05 DIAPHRAGM PROTECTED GAUGES

- A. The Contractor shall provide diaphragm seals on sludge gauges to prevent the fluid to be measured from clogging or corroding the Bourdon tube of pressure, vacuum and compound gauges.
- B. Diaphragm seals shall be suitable for the gauge furnished; gauges to be used with diaphragm seals shall be Grade AA gauges conforming to the requirements specified herein. Chemical gauges shall have the diaphragm seal as an integral part. Overall accuracy for diaphragm protected units shall be Grade A.
- C. Diaphragms shall have an overall diameter of not less than 2-1/2 inches and shall be made of a material that is corrosion resistant and compatible with the process fluid. Diaphragm protected gauges shall be factory filled with Glycerin oil or approved equal and calibrated by the gauge manufacturer. Unless specified otherwise, diaphragm protected gauges shall be provided with sintered metal snubbers or pulsation dampers.
- D. Diaphragm housing assembly shall be of durable stainless or cadmium plated with a 3/4 inch NPT process connection. The lower housing shall have a 1/4 inch NPT flushing connection and 1/4 inch NPT plug, to allow venting or the introduction of cleaning fluid on the process side of the diaphragm seal. The bottom housing shall be made of a material that is corrosion resistant and compatible with the process fluid. A clean out ring shall be provided to hold the diaphragm captive in the upper housing so that the assembly may be removed for

recalibration or cleaning of the process side without loss of instrument fluid. Diaphragm protected gauges and seals shall be ACCO Helicoid Diaphragm Seal Type 100 HACF, Ashcroft Diaphragm Seal Type 101, or equal.

2.06 GAUGE PROTECTION AND ACCESSORIES

- A. Unless otherwise shown or specified, pressure gauges shall have under pressure protection and vacuum gauges shall have overpressure protection. For helical roller type pressure gauges, the gauge shall have a left hand movement for under pressure protection; for all other gauges, under pressure protection stops shall be provided. For vacuum gauges with helical roller movement, gauges shall have right hand movement for overpressure protection; all other gauges shall have suitable overpressure protection stops.
- B. Unless otherwise shown or specified, all pressure, vacuum and compound gauges shall be provided with stainless steel sintered metal snubbers of porosity suitable for this service. Snubbers shall be ACCO Helicoid No. S-2 or S-4, Ashcroft Chemquip No. 1112S or equal.
- C. Diaphragm protected gauges for normal service shall be provided with rough plumbing 3/4 inch stop valves for shut-off cocks, and 3/4 inch red brass pipe. Valves shall have a bronze body, stainless steel ball, and teflon seats, valves shall have a spring-closing handle.
- D. Gauges other than diaphragm protected gauges shall be installed complete with incidental shut-off cock and tees with test cock with a female outlet. All pipe and fittings shall be brass. The gauge shall be mounted directly in the outlet of the tee-bearing test cock.

END OF SECTION

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SECTION 15140

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish all labor, materials, equipment and incidentals required to install, and make completely ready for operation, pipe hangers, supports, concrete inserts, and anchor bolts including, metallic hanging and supporting devices as specified herein and as shown on the Drawings.

B. Related work

1. Section 03300 – Cast-In-Place Concrete
2. Section 09900 – Painting

1.02 REFERENCES

A. American Society of Mechanical Engineers (ASME)

1. ASME B31.1, Power Piping

B. Manufacturers Standardization Society Standard Practice (MSS-SP)

1. MSS-SP-58, Pipe Hangers and Supports, Materials, Design and Manufacture.
2. MSS-SP-69, Pipe Hangers and Supports, Selection and Application.

1.03 REQUIREMENTS

A. Design Requirements

1. The equipment specified herein is intended to support the various types of pipe and piping systems required for the Work.
2. The details shown on the Drawings are intended to indicate the generally desired methods of support under normal conditions.
3. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact through 360 degrees in all three dimensions.
4. It shall be the responsibility of the Contractor to provide a Professional Mechanical Engineer licensed in the **State of Massachusetts**, with a minimum of 5 years of demonstrated experience in the design of supports and connections, to design the supports and connections for all equipment for all weights and applied pressures as indicated on the Drawings.
5. In the design of hangers, supports and anchors, pipe pressures shall be taken as the maximum rated pressure specified for pipe lines carrying gases and air and twice the maximum rated pressure specified for pipe lines carrying liquids.
6. Payment for such design services shall be included in the Prices bid for furnishing and installing pipe lines.

7. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions.
8. All supporting equipment, with the exception of springs, shall be designed with a minimum working factor of safety of five based on the ultimate tensile strength of the material.
9. Where additional structural members are required, they shall be designed for the specific loads they are to support in accordance with the requirements of Massachusetts Building Code.

B. Performance Requirements

1. All hangers, supports and appurtenances shall conform to the latest requirements of the following listed references except as supplemented or modified by the requirements of this Specification.
 - a. ANSI B 31.1.
 - b. MSS-SP-58.
 - c. MSS-SP-69.

1.04 SUBMITTALS

A. In accordance with SECTION 01300.

1. Representative catalog cut for each different type of pipe hanger or support indicating the materials of construction, important dimensions and range of pipe sizes for which that hanger is suitable. Where standard hangers are not suitable, submit detailed drawings showing materials and details of construction for each type.
 2. Complete piping drawings indicating type of hanger, location, and magnitude of load transmitted to the structure. Submittals shall use detail numbers as shown on the Drawings to indicate type of support proposed wherever possible.
- B. Design computations shall not be submitted for review. Any design computations submitted shall be returned without comment. A design certificate shall be submitted prior to installation of any piping.

1.05 DELIVERY, STORAGE AND HANDLING

- A. All supports and hangers shall be crated, delivered and uncrated so as to protect against any damage.
- B. All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation is completed.
- C. Finished iron or steel surfaces not galvanized or painted shall be properly protected to prevent rust and corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by the following:

1. Grinnell Corp., Providence, Rhode Island.
 2. Carpenter & Patterson, Inc., Woburn, Massachusetts.
 3. F&S Central, Brooklyn, New York.
 4. Elcen Metal Products Co., Franklin Park, Illinois.
 5. Unistrut Northeast, Woburn, Massachusetts
- B. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance shall be considered as equal.
- C. The Drawings and Specifications indicate general and specific methods and details of supporting the various piping systems. Any changes to the support details shown shall be submitted to the Engineer for review.
- D. All uninsulated non-metallic piping such as PVC, fiberglass, etc. shall be protected from local stress concentrations, at each support point by galvanized steel protection shields or other method as approved by the Engineer where pipes are bottom supported 180 degree arc shields shall be furnished. Where 360 degree arc support is required, such as U Bolts, protection shields shall have a 50 mils minimum thickness, not be less than 12 inches in length and be securely fastened to pipe with stainless steel or galvanized metal straps not less than 1/2 inch wide.
- E. All insulated pipe shall be furnished with a rigid foam insulating saddle at each pipe support location as specified under insulation. Provide galvanized protection shields as specified in Paragraph 2.01D above at each location.
- F. Where pipe hangers and supports come in contact with copper piping provide protection from galvanic corrosion by the following:
1. Wrap pipe with 60 mils thick neoprene sheet material and galvanized protection shield.
 2. Provide isolators similar to Elcen figure number 228.
 3. Provide copper plated or PVC coated hangers and supports.
- G. Pipe supports shall be provided as follows:
1. Cast iron soil pipe: maximum support spacing of 5.0 feet with a minimum of one support per pipe section at the joints.
 2. Steel pipe: maximum support spacing of 10 feet with a minimum of one support per pipe section at the joints.
 3. Fiberglass pipe: as recommended by the manufacturer except that support spacing shall not exceed 5 feet.
 4. PVC pipe: as recommended by the manufacturer except that support spacing shall not exceed 3 feet. For pipe equal to or less than I inch in diameter and 5 feet for all other pipe sizes.
 5. Support spacing for steel pipe 2 inches and smaller and copper tubing shall not exceed 5 feet.
 6. Ductile iron pipe: maximum support spacing of 10 feet with a minimum of one support per pipe section at the joints.
 7. All vertical pipe shall be supported at each floor or at intervals of not more than 12 feet by approved pipe collars, clamps, brackets, or wall rests, and at all points necessary to insure rigid construction.
 8. Pipe supports shall not induce point loadings but shall distribute pipe loads evenly along the pipe circumference.

9. Effects of thermal expansion and contraction of the pipe shall be accounted for in the pipe support selection and installation.

2.02 SINGLE PIPE HANGERS

- A. Single pipes shall be supported by hangers suspended by galvanized steel rods from structural steel members, concrete ceilings and beams, bottom of trapeze hangers and wall mounted steel angle brackets.
- B. Hanger rods shall be hot rolled steel, machine threaded and galvanized after fabrication. The strength of the rod shall be based on its root diameter.
- C. Except as otherwise specified herein, pipe hangers shall be adjustable clevis type similar to Grinnell Figure Numbers 65, 260, and 590 as required. Hangers shall be carbon steel with a galvanized finish.
- D. Hanger rods shall be attached to concrete structures using concrete inserts similar to F&S Figures 180, 571 or 150. Inserts shall be malleable iron, or steel with galvanized finish. Beam dampers, C clamps or welded beam attachments shall be used for attaching hanger rods to structural steel members. Where necessary and approved by the Engineer double expansion shields shall be used for attaching to concrete structures.
- E. Where pipes are near walls, beams, columns, etc. and located an excessive distance from ceilings or underside of beams, welded steel wall brackets similar to Carpenter and Patterson Figure numbers 69-68, 84 or 139 shall be used for hanging pipe. Brackets shall be galvanized. Where single pipes rest on top of bracket pipe supports, attachments shall meet requirements as specified under multiple pipe hangers.

2.03 MULTIPLE PIPE HANGERS

- A. Suspended multiple pipes, running parallel in the same horizontal plane, which are adjacent to each other shall be suspended by trapeze type hangers or wall brackets. Trapeze hangers shall consist of galvanized structural steel channel supported from galvanized threaded rod or attached to concrete walls, columns or structural steel support members as required to meet the intent of this specification. Channel shall be similar to F&S Figure 710, rods, concrete inserts, "C" Clamps, beam clamps, welded beam attachments, and expansion shields shall be as specified in 2.02 Single Pipe Hangers.
- B. Except as otherwise specified herein pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets shall be anchor or pipe chair similar to F&S Figures 158, 419, 160A, 160B as required. Materials of construction shall be galvanized steel. Chair "U" bolts shall be tightened to allow freedom of movement for normal expansion and contraction except when pipe must be anchored to control direction of movement or act as a thrust anchor.

2.04 SINGLE AND MULTIPLE PIPE SUPPORTS

- A. Single pipes located in a horizontal plane close to the floor shall be supported by one of the methods specified herein or as shown on the Drawings.

- B. Pipes 3-inch diameter and larger shall be supported by adjustable stanchions similar to F&S Figure 427, constructed of galvanized steel. Stanchions shall provide at least 4-inch adjustment and be flange mounted to floor,
- C. Pipes less than 3-inches in diameter shall be held in position by supports fabricated from steel "C" channel, welded post base similar to Unistrut Figure P2072A and pipe clamps similar to Unistrut Figures P1109 thru P1126. Where required to assure adequate support, fabricate supports using two vertical members and post bases connected together by horizontal member of sufficient load capacity to support pipe. Wherever possible supports shall be fastened to nearby walls or other structural member to provide horizontal rigidity. More than one pipe may be supported from a common fabricated support. All supports unless specified elsewhere shall be galvanized.
- D. Where required, pipe shall be supported using concrete anchor posts constructed in accordance with SECTION 03300. Pipe shall be securely fastened to concrete anchor posts using suitable metal straps as required and approved by the Engineer.

2.05 WALL SUPPORTED PIPES

- A. Single or multiple pipes located adjacent to walls, columns or other structural members shall whenever deemed necessary shall be supported using welded steel wall brackets similar to Carpenter and Patterson Figure numbers 69-78, 84, or 134; or "C" Channel with steel brackets similar to Unistrut pipe clamps. All members shall be securely fastened to wall, column, etc. using double expansion shields or other method as approved by the Engineer.
- B. Pipe shall be attached to supports using methods hereinbefore specified to meet the intent of this Specification.
- C. All supports shall be galvanized.

2.06 BASE ANCHOR SUPPORT

- A. Where pipes change direction from horizontal to vertical via a bend, a welded or cast base anchor support shall be installed at the bend to carry the load. The bend anchor shall be fastened to the floor with double expansion shields or other method as approved by the Engineer.
- B. Where shown on the Drawings, pipe bends shall be supported using concrete anchor posts. Pipes shall be securely fastened to concrete supports with suitable metal bands as required and approved by the Engineer.

2.07 VERTICAL PIPE SUPPORTS

- A. Where vertical pipes are not supported by a Unistrut system as specified in Paragraph 2.08, they shall be supported in one of the following methods.
 - 1. For pipes 1/4-inch to 2-inch in diameter, an extension hanger ring shall be provided with an extension rod and hanger flange. The rod diameter shall be as recommended by the manufacturer for the type of pipe be supported. The hanger ring shall be galvanized steel or PVC clad depending, on the supported pipe. The hanger ring shall be equal to

- Carpenter & Peterson Figure number 81 or 81CT. The anchor flange shall be galvanized malleable iron similar to Carpenter & Patterson Figure number 85.
2. For pipes equal to or greater than 1/2-inch in diameter extended pipe clamps similar to Carpenter and Patterson Figure number 267 may be used. The hanger shall be attached to concrete structures using double expansion shields, or to steel support numbers using welding lugs similar to Carpenter & Patterson Figure number 220.
 3. Pipe riser clamps shall be used to support all vertical pipes extending, through floor slabs. Riser clamps shall be galvanized steel similar to Carpenter & Patterson Figure number 126. Copper clad or PVC coated clamps shall be used on copper pipes. Insulation shall be removed from insulated pipes prior to installing riser dampers.
 4. Unless otherwise specified, shown, or specifically approved by the Engineer, vertical runs exceeding 11 feet, pipes shall be supported by approved pipe collars, clamps, brackets or wall rests at all points required to insure a rigid installation.

2.08 SPECIAL SUPPORTS

- A. Pipe supports shall be provided for closely spaced vertical piping systems as shown on the Drawings or as otherwise required to provide a rigid installation. The support system shall consist of a framework suitably anchored to floors, ceilings and walls and be as manufactured by the Unistrut Corporation, Globe-Strut as manufactured by the Metal Products Division of U.S. Gypsum, or equal.
- B. Vertical and horizontal supporting members shall be U shaped channels similar to Unistrut Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps equal to Unistrut series P1100M and series P2558. All components shall be of mild steel.
- C. The assemblies shall be furnished complete with all nuts, bolts, and fittings required for a complete assembly including end caps for all members.
- D. The design of each individual framing system shall be the responsibility of the Contractor. Shop drawings, as specified above shall be submitted and shall show all details of the installation, including dimensions and types of supports. In all instances the completed frame shall be adequately braced to provide a complete rigid structure when all the piping has been attached.
- E. Any required pipe supports for which the supports specified in this Section are not applicable shall be fabricated or constructed from standard structural steel shapes in accordance with AISC Specifications, have anchor hardware similar to items previously specified herein, shall meet the minimum requirements listed below and be subject to the approval of the Engineer.
 1. Pipe support systems shall meet all requirements of this Section and all related Sections of the Specification.
 2. Complete design details of the entire pipe support systems shall be provided, for review by the Engineer.
 3. The pipe support system shall not impose loads on the supporting structures in excess of the loads for which the supporting structure is designed.

2.09 SURFACE PREPARATION AND SHOP PAINTING

- A. All surfaces shall be prepared and shop painted as part of the work of this Section. Surface preparation and shop painting shall be as specified in SECTION 09900.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pipe and appurtenances connected to the equipment shall be supported in a manner to prevent any strain from being imposed on the equipment or piping system.
- B. Pipe and tubing shall be supported as required to prevent damaging stresses in the pipe or tubing material, valves and fittings, and to support and secure the pipe in the intended position and alignment. Supports shall be sufficiently close together such that the sag of the pipe is within limits that will permit drainage and avoid excessive bending stresses from concentrated loads between supports.
- C. Pipes, horizontal and vertical, requiring rigid support shall be supported from the building structure by approved methods. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or specific herein. No piping shall be supported from metal stairs, ladders and walkways unless specifically directed or authorized by the engineer.
- D. Where flexible couplings are required at equipment, tanks, etc. the end Opposite to the piece of equipment, tank, etc. shall be rigidly supported.
- E. Pipe supports shall be installed to minimize, lateral forces through valves, both sides of split type couplings and sleeve type couplings, and to minimize all pipe forces on pump housings. Pump housings shall not be utilized to support connection pipes.

END OF SECTION

CERTIFICATE OF DESIGN FOR PIPE HANGERS AND SUPPORTS

(Owner)

Contract Reference: _____

_____, dated _____.

In accordance with the provisions of the above referenced Contract, as the designated Contractor,

(Contractor's Name and Address)

hereby certifies that _____

(Contractor's Name and Address)

- (1) Is properly licensed and currently registered as a Professional Engineer in the State (or Commonwealth) of _____;
- (2) Is fully qualified to design and supervise the _____

(Item of work and location)

In accordance with the provision specified under the appropriate Section and/or Subsections of the Contract Documents:

- (3) Has successfully designed and supervised _____

(Item of work)

before and demonstrates a minimum of ten (10) documented years of proven experience in such field;

- (4) Has personally examined the type(s) and locations(s) of the Work required under this Contract, and the overall conditions associated therewith, to the extent necessary to fully satisfy his or her professional responsibilities for designing and supervising the above referenced work;

- (5) Has prepared the attached design in full compliance with the applications and requirements of the Contract Documents, sound engineering practice, modern accepted principles of construction, and all applicable federal, state and local laws, regulations, rules and codes having jurisdiction over the Work;
- (6) Will provide sufficient supervision and technical guidance to the Contractor throughout the Work to ensure compliance with the design and all quality assurances necessary to successfully complete the Work;
- (7) Hereby indemnifies and holds harmless the _____
 _____ and BETA Group, Inc.,
 (name of owner)
 and their agents, employees and representatives, from and against any and all claims, whether directly or indirectly, arising out of, relating to or in connection with the Work; and
- (8) This "Certificate of Design" together with all applicable designs, drawings, details, specifications on other related documents necessary to complete the Work as specified, have been signed and sealed pursuant to applicable state law.

In recognition and observance of the above referenced statements, the undersigned parties hereby acknowledge and accept the responsibilities and obligations associated therewith.

CONTRACTOR:CONTRACTOR'S ENGINEER

(Contractor's Name)

(Engineer's Name)

By: _____

By: _____

(Name and Title)

(Name and Title)

Date: _____
(SEAL)

Date: _____
(P.E. STAMP)

(Note: Contractor to fully reference all attachments below)

END OF SECTION

DIVISION 16

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SECTION 16000

BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes all labor, materials, tools, equipment, and accessory items and performing all operations necessary to furnish and install the complete electrical work in accordance with this section of these specifications, the drawings and the standards of the applicable codes listed herein.
- B. The work shall include, but not be limited to, furnishing and installation of equipment and items listed below and installation only of items furnished under other sections of these specifications.
 - 1. Complete electrical services as hereinafter specified.
 - 2. Conduit, wire and electrical connections are required on certain items specified in sections of these specifications other than the electrical section. This Contractor shall examine all sections of these specifications to determine the complete scope of the electrical work.
 - 3. Raceways and fittings
 - 4. Wires and cables
 - 5. Miscellaneous equipment
 - 6. Panelboards
 - 7. Lighting systems
 - 8. Generators
 - 9. Grounding systems
 - 10. Underground system
 - 11. Demolition of existing electrical systems.
- C. Mount and wire operator's stations, power conversion equipment, and motor control systems furnished under other Divisions of these Specifications.
- D. Mount and wire process instruments and control cabinets furnished under other Divisions of these Specifications. Furnish and install all conduit, wire and interconnections between process instrumentation primary elements, transmitters, local indicators and receivers. Mount and wire all lightning and surge protection equipment at process instrumentation transmitters and receivers.

- D. Mount and make field connections to “packaged” equipment furnished under other Divisions of these Specifications.
- F. Documents Applicable to the Work of this Section:
 - 1. Division 0 of the Contract Documents (Contract Forms and Requirements).
 - 2. Division 1 of the Technical Specifications.
 - 3. Technical Specifications: Section 16000 - Basic Electrical Requirements, and the following sub-sections:
 - a. Section 16060 – GROUNDING SYSTEM
 - c. Section 16080 – UNDERGROUND SYSTEMS
 - b. Section 16085 – MISCELLANEOUS EQUIPMENT
 - c. Section 16120 – WIRE AND CABLES
 - d. Section 16130 – RACEWAYS AND FITTINGS
 - e. Section 16442 – PANELBOARDS
 - f. Section 16500 – LIGHTING SYSTEM
 - g. Section 16612 – DIESEL ENGINE GENERATORS
 - h. Section 16613 – GASEOUS ENGINE GENERATORS

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Circuit breakers
 - 2. Panelboards
 - 3. Generators
 - 4. Automatic transfer switches
 - 5. Lighting fixtures
 - 6. Miscellaneous equipment
- B. The manufacturer's data sheets with product designation or catalog numbers shall be submitted for the following material:
 - 1. Wire
 - 2. Conduit
 - 3. Receptacles
 - 4. Boxes and fittings
- C. Submit all other data as specified herein.
- D. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this Section 16000.
- E. No material shall be ordered or shop work started until the Engineer's approval of shop drawings has been given.

- F. Prior to submitting shop drawings for lighting fixtures, verify the type of ceiling suspension systems being installed. Notify Engineer of any discrepancies between fixture type specified and suspension system. Additional cost rising from failure to notify the Engineer will be the responsibility of the Contractor.
- G. Operation and Maintenance Manuals - Prepare manuals in accordance with Section 01730.
- H. Record Drawings - Prepare as specified in Part 1 of this Section.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 and as specified herein.
- B. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out-of-doors. Electrical equipment shall be stored in dry permanent shelters. If stored for more than two weeks, the equipment shall receive all maintenance considerations required by the manufacturer for the proper storage of equipment. Proper storage in this context shall include the provision of heaters and dehumidifiers to keep the equipment dry at all times. If any apparatus has been damaged, such damage shall be repaired at no additional cost to the Owner. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, or shall be replaced at no additional cost to the Owner.

1.04 DESIGN CRITERIA

- A. Service Characteristics for the Industrial, Myles Standish, and Stevens Street Pump Stations.
 - 1. Primary Utility Voltage: 13.8KV
 - 2. Secondary Voltage - 120/208V, 3-Phase.
 - 3. All equipment and wiring shall be suitable for the applied voltage.
- B. Service Characteristics for the Davis Street, Partridge Circuit, School Street, and Wellesley Circle Pump Stations.
 - 1. Primary Utility Voltage: 13.8KV
 - 2. Secondary Voltage - 120/240V, 1-Phase.
 - 3. All equipment and wiring shall be suitable for the applied voltage.
- C. Service and Metering
 - 1. The power company serving this project is Taunton Municipal Light and Power (TMLP).

2. Myles Standish Pump Station Service

- a. The existing pad mounted utility transformer shall be relocated and a new service that will be obtained at 120/208Volts, 3-phase, 4-wire.
- b. Furnish and install the primary service conduit, handholes, and a new concrete transformer pad. TMLP shall relocate the transformer and make all transformer connections.
- c. Furnish and install the secondary service conduit, wire and connectors for the pump station's service.
- d. Furnish and install the secondary service conduit and handholes for the existing street/traffic lighting service. TMLP shall furnish and install the street lighting service wiring.
- e. Provide a temporary 10KW portable generator to maintain the 120/208V, 3-phase, 4-wire existing street/traffic lighting service 24 hours a day for one month while the work to relocate the transformer is being conducted. The generator shall be capable of a 48 hour full load runtime without refueling, the contractor shall be responsible for keeping the generator running 24 hours a day and providing associated fuel and maintenance. Provide a traffic police detail for any generator maintenance and refueling that requires the generator to be shutdown.

2. Davis Street Pump Station Service

- a. The existing service and pole riser shall be replaced with a new service and pole riser that will be obtained at 120/240 Volts, 1-phase, 3-wire from the existing utility pole.
 - b. Furnish and install the secondary service conduit, wire and connectors.
4. TMLP will provide the meters, the contractor shall provide the meter sockets and install all the metering equipment in accordance with the TMLP requirements.
 5. All work and material for the electrical service shall be in accordance with the requirements of TMLP.
 6. Make all arrangements and coordinate with TMLP for obtaining the service, pay all charges and furnish all labor and material for the services. The utility company's charges shall be identified in the bid as an Allowance. An invoice from the utility company shall be submitted to the Contractor. There shall be no additional changes for overhead profit, insurance, or incidental expenses.

D. Requirements of the Regulatory Agencies

1. The final, complete installation shall comply with all state and local statutory requirements having jurisdiction. The Contractor shall arrange for all necessary permits, pay all fees and arrange for all required inspections by local authorities.

In general, all work shall comply with the requirements of the National Electrical Code, all state codes and the codes and ordinances of the city or town in which the work is to be done.

E. Tests and Settings

1. Test all systems furnished under DIVISION 16 - ELECTRICAL and repair or replace all defective work. Make all necessary adjustments to the systems and instruct the Owner's personnel in the proper operation of the system.
2. Make all circuit breaker and motor circuit protector settings based on the connected equipment manufacture's recommendations.
3. The following minimum tests and checks shall be made prior to the energizing of electrical equipment. A certified test report shall be submitted stating that the equipment meets and operates in accordance with manufacturer's and job specifications, and that equipment and installation conforms to all applicable standards and specifications.
 - a. Testing of protective relays, static devices, transfer switches, circuit breakers and motor circuit protectors for calibration and proper operation and settings.
 - b. Over potential, high potential, insulation resistance and shield continuity tests for cables.
 - c. Mechanical inspection of switches, transfer switches and circuit breakers.
4. The Engineer shall be immediately notified of any unfavorable test results or indication of faulty equipment. No piece of equipment shall be energized until the test data is evaluated and the equipment is proven acceptable.
5. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, the Contractor shall promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.

1.05 RELATED WORK NOT INCLUDED

- A. Excavation and backfilling, including gravel or sand bedding for underground electrical work is included under DIVISION 2 - SITE WORK of these Specifications.
- B. Concrete work, including concrete electrical duct encasement, is included under DIVISION 3 - CONCRETE of these Specifications.

1.06 SLEEVES AND FORMS FOR OPENINGS

- A. Provide and place all sleeves for conduits penetrating floors, walls, partitions etc. When located in formed concrete walls locate all necessary slots for electrical work and form before concrete is poured.
- B. Provide waterproof sealing for the penetrations through exterior walls, etc.
- C. Provide fireproof sealing for penetrations through fireproof walls, etc.
- D. Foam type fire and water proofing is not allowed.

1.07 CORING

- A. Provide all coring for conduits penetrating floors, walls, partitions etc.
- B. Provide waterproof sealing for the penetrations through exterior walls, etc.
- C. Provide fireproof sealing for penetrations through fireproof walls, etc.
- D. Foam type fire and water proofing is not allowed.

1.08 SUPPLEMENTARY SUPPORTING STEEL

- A. Provide all supplementary steelwork required for mounting or supporting equipment and materials.
- B. Steelwork shall be firmly connected to building construction as required.
- C. Steelwork shall be of sufficient strength to allow only minimum deflection in conformity with manufacturer's published requirements.
- D. All supplementary steelwork shall be installed in a neat and workmanlike manner parallel to floor, wall and ceiling construction; all turns shall be made at forty-five and ninety degrees, and/or as dictated by construction and installation conditions.
- E. All manufactured steel parts and fittings shall be galvanized steel for NEMA 12 Areas and stainless steel for NEMA 4X, NEMA 7, AND NEMA 8 areas.

1.09 ELECTRICAL HAZZARDOUS CLASSIFCATION AND NEMA RATINGS FOR ELECTRICAL INSTALATION AND ENCLOSURES

- A. Unclassified, NEMA Type 1 for within the electrical enclosure.
- B. Unclassified, NEMA Type 4X for exterior.
- C. Class 1, Division I, NEMA Type 8 for within and 18" above Wet Wells.

1.10 INTERPRETATION OF DRAWINGS

- A. The Drawings are not intended to show exact routing of conduit runs or terminations. Contractor shall determine exact location of conduit terminations by examinations of approved shop drawings. The Contractor shall not reduce the size or number of conduit runs indicated on the drawings.
- B. The final routing of raceways shall be determined by structural conditions, interferences with other trades and by terminal locations on apparatus. The Engineer reserves the right of a reasonable amount of shifting at no extra cost up until time of roughing in the work.
- C. Locate pull boxes, panelboards, control pushbuttons, terminal cabinets, safety switches and such other apparatus as may require periodic maintenance, operation, or inspection, so that they are easily accessible. If such items are shown on the drawings in locations which are found to be inaccessible, advise the Engineer of the situation before work is advanced to the point where extra costs will be involved.
- D. Each three-phase circuit shall be run in a separate conduit unless otherwise shown on the drawings.
- E. Unless otherwise approved by the Engineer conduits shown exposed shall be installed exposed; conduits shown concealed shall be installed concealed.
- F. Where circuits are shown as “home-runs” all necessary fittings and boxes shall be provided for a complete raceway installation.
- G. In general, wiring and raceway systems for lighting, receptacles, fire alarm, telephone and intercommunications systems are not indicated on the drawings but shall be furnished and installed under this section.
- H. Each branch circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one single phase circuit is not allowed.
- I. Verify with the Engineer the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.
- J. Any work installed contrary to drawings shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.
- K. The locations of equipment, fixtures, outlets, and similar devices shown on the drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.
- L. Circuits on three phase panelboards shall be field connected to result in evenly balanced loads on each phase.
- M. Surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.

- N. Circuit layouts are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting, and other electrical system shown. Additional circuits shall be wherever needed to conform to the specific requirements of the equipment.
- O. All connections to equipment shall be made as required, and in accordance with the approved shop and setting drawings.
- P. Schematic diagrams shown on the drawings indicate the required functions only. Standard circuits of the particular manufacturer may be used to accomplish the functions indicated without exact adherence to the schematic drawings shown. Additional wiring or conduit required for such deviations shall be furnished at Contractor's expense. Contractor must ensure that all components necessary to accomplish the required function are provided.

1.11 SIZE OF EQUIPMENT

- A. Investigate each space in the structure 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 structure.
- B. The equipment shall be kept upright at all times. When equipment has to be tilted for ease of passage through restricted areas during transportation, the manufacturer shall be required to brace the equipment suitable, to insure that the tilting does not impair the functional integrity of the equipment.

1.12 TEMPORARY POWER AND LIGHTING

- A. The Electrical Subcontractor shall furnish and install feeders of sufficient size from the utility company for the electric light and power requirements for the project while under construction and until the permanent feeders and related equipment have been installed and are in operation. Temporary lighting shall be based on a minimum of one watt per square foot covering each and every square foot in the building. Sufficient wiring, lamps, and outlets shall be installed to insure proper lighting of the project area. Minimum sized lamp used shall be 1500 lumens. Where higher lighting intensities are required by Federal or State Standards of Laws or otherwise specified, the above specified lumens shall be increased to provide these increased intensities.
- B. All necessary transformers, meters, cables, panelboards, switches, temporary lamp replacements and accessories required for the temporary light and power installation shall be provided by the Electrical Subcontractor.
- C. The Electrical Subcontractor shall provide and maintain in each area of the building and the building exterior, a feeder or feeders of sufficient capacity for the requirements of the entire floor and he shall provide a sufficient number of outlets, located at convenient points, so that extension cords of not over 50 ft. in length will reach all work requiring temporary light or power.

- D. The Electrical Subcontractor shall install and maintain the wiring and accessories for the portable trailer office of the General Contractor.
- E. All temporary electrical work shall meet the requirements of the National Electrical Code Article 305 Temporary Wiring, the Local Utility Company, and all Federal Standards and Laws.
- F. All temporary wiring and accessories thereto installed by the Electrical Subcontractor shall be removed after their purposes have been served.
- G. The Contractor will pay for the cost of electric energy consumed by himself and by all of his Subcontractors, unless otherwise indicated.
- H. Provide all temporary lighting and power required above during the normal working hours of the project or a total of ten (10) hours per normal working day; Saturdays, Sundays and legal holidays are excluded. The ten hours per day shall include manning the temporary power and lighting 2 hour before and 2 hour after a normal eight (8) hour working day. In addition to the above, provide and maintain, to the satisfaction of the local authorities having jurisdiction, all temporary lighting and power that may be required for safety purposes. The Electrical Subcontractor will be compensated by the General Contractor for any additional standby time, materials or equipment required by the General Contractor or other Subcontractors beyond the normal working hours, as defined above.

1.14 RECORD DRAWINGS

- A. Record drawings shall be provided under this Section in accordance with Section 01780 and as specified herein.
- B. As work progresses and for the duration of the Contract, maintain a complete and separate set of prints of Contract Drawings at the job site at all times. On a daily basis, record work completed and all changes from original Contract Drawings clearly and accurately, including work installed as a modification or addition to the original design such as change orders, instructions issued by the Engineer, or conditions encountered in the field.
- C. Drawings shall show record condition of details, sections, and riser diagrams, and control changes. Schedules shall show actual manufacturer and make and model numbers of final equipment installation. Remove all superceded data to show the completed work. Accurately indicate the location, size, type, and elevation of new utilities and their relationship to other utilities.
- D. The Record Drawings will be used as a guide for determining the progress of the Work installed. They shall be inspected on a regular basis and shall be corrected immediately if found inaccurate or incomplete. Requisitions for payment will not be approved until the Drawings are accurate and up-to-date.
- E. At completion of Work prepare a complete set of Record Drawings showing all systems as actually installed. The Contract Drawing electronic CAD files will be made available for this Contractor's copying, at his expense, into reproducibles to serve as backgrounds for the Record Drawings. Provide all drawings necessary to show the required as-built

information. Submit three sets of prints to the Engineer for comments as to compliance with this Section. Make all modifications so noted by the Engineer.

- F. Certify the accuracy of the record drawings. Record Drawings shall become the property of the Owner.
- G. When required by jurisdiction, submit the record set for approval by the Authority Having Jurisdiction in a form acceptable to the jurisdiction.

1.15 COMPONENT INTERCONNECTIONS

- A. Components of equipment furnished under this Specification will not be furnished as integrated systems.
- B. Analyze all systems components and their shop drawings; identify all terminals and prepare drawings or wiring tables necessary for component interconnection.
- C. Furnish and install all component interconnections.

1.16 MANUFACTURER'S SERVICES

- A. Provide manufacturer's services for testing, training and start-up of the following equipment:
 - 1. Generator.
 - 2. Automatic Transfer Switch.
 - 3. The time required for each system shall be as hereinafter specified. The time specified shall be used as directed by the Engineer and shall not be used by the manufacturer or Contractor for field adjustments due to manufacturing or shipping defects.

1.17 MATERIALS

- A. Materials and equipment used shall be Underwriters Laboratories, Inc. listed wherever standards have been established by that agency. Written approval by the Engineer and local inspecting authority is required wherever UL Listed approval is not available.
- B. Manufacturer of Principal Equipment
 - 1. All lighting and power panelboards shall be made by one manufacturer.
 - 2. All conduit of a given type shall be made by one manufacturer.
 - 3. All wire and cables of a given type shall be made by one manufacturer.

1.18 WARRANTY

- A. Provide warranty and guarantee on all equipment furnished and work performed for a period of one (1) year from the date of substantial completion.

PART 2 (NOT USED)

PART 3 (NOT USED)

- END OF SECTION -

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SECTION 16060
GROUNDING SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes the furnishing and installing of a complete grounding system in strict accordance with Article 250 of the National Electrical Code and as specified herein and as shown on the drawings.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Ground rods
 - 2. Ground bus bars

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

PART 2 – PRODUCTS

2.01 GROUND RODS

- A. Ground rods shall be copper clad steel 3/4 inch in diameter and 10 feet in length unless otherwise shown on the drawings. Rods shall one 10 foot length rod. Ground rods shall be Copperweld, equal by A.B. Chance Co., or equal.

2.02 GROUNDING BUS BARS

- A. Provide a grounding bus bar within electrical enclosures.
- B. Grounding bus bars shall be copper, not less than ¼ inch by 2 inch by 12 inch.
- C. All lugs, bolts and nuts shall be silicon bronze.
- D. Buses shall be mounted to the room wall with standoff isolators, standoff brackets, and mounting bolts.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Above ground grounding electrode conductors shall be run in schedule 80 PVC conduits.
- B. Grounding conductors shall be run with feeders where shown on the drawings or hereinafter specified.
- C. Liquid tight flexible metal conduit in sizes 1 inch and larger shall have bonding jumpers. Bonding jumpers shall be external, run parallel (not spiraled) and fastened with plastic tie wraps. Tie wraps shall be installed 12 inches apart and not more than 6 inches from ends.
- D. Connect the following equipment by separate wire or cable directly to the grounding grid system:
 - 1. Service entrance circuit breaker
 - 2. Ground buses
 - 3. Metal Fencing
 - 4. Generator Enclosure
- E. Connect the following equipment by separate wire or cable to the ground bus in the distribution equipment servicing the equipment:
 - 1. Panelboards
 - 2. Motors
 - 3. Control panels
 - 4. All feeders and branch circuits
 - 5. Receptacle circuits
- F. The following equipment shall be grounded through the metallic raceway systems with permanent and effective ground connections:
 - 1. All metal cases and support frames
 - 2. Lighting system
- G. Bond the following N.E.C. approved electrodes together to form a ground grid system:
 - 1. Grounding rods and buses
 - 2. Buried bare copper conductors
- H. Grounding electrodes shall be driven where shown on the drawings.
- I. All grounding connections shall be made by means of approved bronze clamps. Exposed connections between different metals shall be sealed with No-Oxide Paint Grade A, or equal.

- J. All buried connections shall be made by a thermic welding process equal to Cadweld. Molds used for the welding process shall be new having no prior usage. Molds shall be the specific type for the connection to be made.
- K. Light fixture bases shall be furnished with a grounding point.
- L. All buried conductors shall be laid slack in trenches. The earth surrounding the cables shall be void of sharp objects which may injure the cables. Backfill material shall be natural earth. Where cables are exposed to mechanical injury they shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard. Connections shall be made as hereinbefore specified.

3.02 TESTING

- A. The grounding system shall be tested under this section.
- B. The equipment grounding shall be checked to insure continuity of the ground return path.
- C. The ground grid systems shall be tested using the three terminal fall in potential method. A minimum of eight test points for each ground grid system shall be submitted for review by the Engineer. The test points shall be made along a straight line from the grid system to the reference terminal. The distance between the grid system and the reference terminal shall be consistent with normal practices for ground testing.
- D. All test equipment shall be furnished hereunder and shall be similar to Biddle Earth Tester No. 250220 or equal.
- E. These tests shall be performed during the dry season. Tests shall be performed before loaming and seeding or paving work has been performed.
- F. The Contractor shall notify the Engineer immediately if the ground grid system exceeds 5 ohms.

3.03 CLOSEOUT ACTIVITIES

- A. Provide in accordance with Section 01700.

- END OF SECTION -

SECTION 16080

UNDERGROUND SYSTEMS

1.00 PART 1 – GENERAL

1.01 SCOPE

- A. The work of this section includes furnishing and installing of a complete underground system of raceways, handholes, and frames and covers as specified herein and as shown on the drawings.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Raceways
 - 2. Handholes and covers
 - 3. Warning Tape

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

2.00 PART 2 – PRODUCTS

2.01 RACEWAYS

- A. Raceways shall be PVC schedule 40 conduit. Raceway materials shall be in accordance with Section 16130 (Raceways and Fittings).

2.02 HANDHOLES AND COVERS

- A. Hand holes shall be UL listed, made of polymer concrete with polymer concrete and open bottom.
- B. The polymer concrete shall be molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.
- C. Impact resistant tested per ASTM D-2444.
- D. Hand hole enclosure and covers shall meet or exceed the Tier 22 load requirements set forth in the American National Standards Institute's ANSI/SCTE 77 2010
- E. Hand holes shall be 30"x48"x24".

- F. Covers shall be securely bolted to enclosure with stainless steel bolts and be on type and be embedded with the following logs:
 - 1. “ELECTRICAL” logo for electrical power applications
 - 2. “COMMUNICATIONS” logo telecommunication applications.
 - 3. “CONTROL” logo low voltage applications.
- G. Provide 12 inches of compacted crushed stone under all hand holes

2.03 POLYETHYLENE WARNING TAPE

- A. Warning tape shall be red polyethylene film, 6 inch minimum width, Type XB-720 by W.H. Brady Co., or equal.

3.00 PART 3 – EXECUTION

3.01 INSTALLATION

- A. Raceways shall be installed to drain away from structures. Raceways between handholes shall drain toward the handholes and wetwells. Raceway slopes shall not be less than 3 inches per one hundred feet.
- B. Unless indicated otherwise, raceway banks shall be encased in 3,000 psi concrete. Concrete shall be reinforced with #5 ASTM A615 Grade 60 steel rebar rods.
- C. Plastic spacers shall be used to hold raceways in place. Spacers shall provide not less than two inch clearance between raceways.
- D. The minimum cover for raceway banks shall be 30 inches unless otherwise permitted by the Engineer.
- E. Where bends in raceways are required, long radius elbows, sweeps and offsets shall be used. Sweeps at riser pole shall be rigid steel encased in concrete.
- F. All raceways shall be swabbed clean before cable installation.
- G. Spare raceways shall be plugged and sealed watertight at all buildings and structures.
- H. Raceways in use shall be sealed watertight at all buildings and structures.
- I. Rigid steel conduit shall be used for risers at the service pole and other locations shown on the drawings. Conduit sweep at pole base shall be rigid steel conduit.
- J. Raceway terminations at manholes shall be with end bells.
- K. All underground metallic conduit run underground in direct contact with earth shall be coated with asphaltum or bitumastic varnish or similar corrosion protection the entire length of the run.

- L. All underground raceways/ductbanks shall be marked with warning tape located approximately 12 inches below grade above the raceway/ductbank.

- END OF SECTION -

SECTION 16085

MISCELLANEOUS EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes the furnishing and installing of all miscellaneous equipment as specified herein and as shown on the drawings.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Automatic Transfer Switches
 - 2. Electrical Enclosure Cabinets
 - 3. Surge Suppression Devices
 - 4. Disconnect switches
 - 5. Enclosed Circuit Breakers
 - 6. Enclosure types
 - 7. Wireway
 - 8. Nameplates
 - 9. Meter Socket
 - 10. Magnetic Door Switches
- B. Operation and Maintenance Manuals - Prepare manuals in accordance with Section 01730.
- C. Record Drawings - Prepare as specified in Section 16000.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

PART 2 – PRODUCTS

2.01 AUTOMATIC TRANSFER SWITCHES

- A. Three phase automatic transfer switches shall be true 3-pole, solid neutral type, microprocessor based control designed for an emergency and normal source of 208 Volts, 3 Phase, 4 Wire, 60 Hertz. Current ratings shall be as indicated on the drawings.

- B. Single phase automatic transfer switches shall be true 2-pole, solid neutral type, microprocessor based control designed for an emergency and normal source of 240 Volts, 1 Phase, 3 Wire, 60 Hertz. Current ratings shall be as indicated on the drawings.
- C. The complete switch assembly including accessories shall be listed under UL-1008 for use on emergency systems.
- D. The complete transfer switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available upon request.
- E. System Operation
 - 1. When the voltage on any phase of the normal source drops below 80% or increases to 120%, or frequency drops below 90%, or increase to 110%, or 20% voltage differential between phases occurs, after a programmable time delay period of 0-9999 seconds factory set at 3 seconds to allow for momentary dips, the engine starting contacts shall close to start the generating plant.
 - 2. The transfer switch shall transfer to emergency when the emergency source has reached specified voltage and frequency on all phases.
 - 3. After restoration of normal power on all phases to a preset value of at least 90% to 110% of rated voltage, and at least 95% to 105% of rated frequency, and voltage differential is below 20%, an adjustable time delay period of 0-9999 seconds (factory set at 300 seconds) shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source.
 - 4. After retransfer to normal, the engine generator shall be allowed to operate at no load for a programmable period of 0-9999 seconds, factory set at 300 seconds.
- F. Construction
 - 1. The transfer switch shall be double throw, actuated by two electric operators momentarily energized, and connected to the transfer mechanism by a simple over center type linkage. Dual circuit breaker or movable beam construction is not acceptable. Minimum transfer time shall be 400 milliseconds.
 - 2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungsten alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable.
 - 3. The transfer switch shall be equipped with a safe manual operator, designed to prevent injury to operating personnel. The manual operator shall provide the

same contact to contact transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly.

4. Transfer switch shall be adequately constructed to carry its full rated current on a continuous 24 hour basis in all approved enclosures and shall not show excessive heating or be subject to de-rating.
5. The minimum withstand and close-in current rating in symmetrical amperes shall be equal to or greater than the interrupting rating of the normal power source circuit breaker. In no case shall this rating be less than 20 times the transfer switch full load current rating. The switch contacts shall not weld or be damaged in any way as a result of a fault of up to the withstand and close-in rating.
6. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.
7. A fully rated solid neutral bus bar with required AL-CU neutral lugs shall be provided.
8. Control components and wiring shall be front accessible. All control wires shall be multiconductor 18 gauge 600-volt SIS switchboard type point to point harness. All control wire terminations shall be identified with tubular sleeve-type markers.
9. The switch shall be equipped with 90 degrees C rated copper/aluminum solderless mechanical type lugs.
10. Transfer switches enclosures indicated as NEMA 4 shall be totally enclosed gasketed door in door with blank exterior door and the controller mounted on the interior door.

G. Controls

1. The transfer switch shall be equipped with a microprocessor based control system, to provide all the operational functions of the automatic transfer switch. The controller shall have two asynchronous serial ports. The controller shall have a real time clock with NiCad battery back up.
2. The CPU shall be equipped with self diagnostics which perform periodic checks of the memory I/O and communication circuits, with a watchdog/power fail circuit
3. A door mounted controller with a 20 character, LCD display, with a keypad, which allows access to the system shall be provided. The controller shall have password protection required to limit access to qualified and authorized personnel.

4. The controller shall include three-phase over/under voltage, over/under frequency, phase sequence detection and phase differential monitoring on both normal and emergency sources.
5. The controller shall be capable of storing the following records in memory for access either locally or remotely:
 - a. Number of hours transfer switch is in the emergency position (total since record reset).
 - b. Number of hours emergency power is available (total since record reset).
 - c. Total transfer in either direction (total since record reset).
 - d. Date, time, and description of the last four source failures.
 - e. Date of the last exercise period.
 - f. Date of record reset.

H. Accessories

1. Programmable three phase sensing of the normal source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring.
2. Programmable three phase sensing of the emergency source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases set at 20%, and phase sequence monitoring.
3. Time delay for override of momentary normal source power outages (delays engine start signal and transfer switch operation). Programmable 0-9999 seconds. Factory set at 3 seconds, if not otherwise specified.
4. Time delay to control contact transition time on transfer to either source. Programmable 0-9999 seconds, factory set at 3 seconds.
5. Time delay on retransfer to normal, programmable 0-9999 seconds, factory set at 300 seconds if not otherwise specified, with overrun to provide programmable 0-9999 second time delay, factory set at 300 seconds, unloaded engine operation after retransfer to normal.

6. Time delay on transfer to emergency, programmable 0-9999 seconds, factory set at 3 seconds.
7. A maintained type load test switch shall be included to simulate a normal power failure, keypad initiated.
8. A remote type load test switch shall be included to simulate a normal power failure, remote switch initiated.
9. A time delay bypass on retransfer to normal shall be included. Keypad initiated.
10. Dry contact, rated 10 Amps 120 volts AC, to close on failure of normal source to initiate engine starting.
11. Dry contact, rated 10 Amps 120 volts AC, to open on failure of normal source for customer functions.
12. Light emitting diodes shall be mounted on the microprocessor panel to indicate: switch is in normal position, switch is in emergency position and controller is running.
13. A exerciser shall be provided with (10) 7-day events, programmable for any day of the week and (24) calendar events, programmable for any month/day, to automatically exercise generating plant programmable in one-minute increments. Also include selection of either "no load" (switch will not transfer) or "load" (switch will transfer) exercise period. Keypad initiated.
14. Provision to select either "no commit" or "commit" to transfer operation in the event of a normal power failure shall be included. In the "no commit position," the load will transfer to the emergency position unless normal power returns before the emergency source has reach 90% of it's rated values (switch will remain in normal). In the "commit position" the load will transfer to the emergency position after any normal power failure. Keypad initiated.
15. Two auxiliary contacts rated 10 Amp, 120 volts AC , shall be mounted on the main shaft, one closed on normal, the other closed on emergency. Both contacts will be wired to a terminal strip..
16. A three phase digital LCD voltage readout, with 1% accuracy shall display all three separate phase to phase voltages simultaneously, for both the normal and emergency source.
17. A digital LCD frequency readout with 1% accuracy shall display frequency for both normal and emergency source.
18. An LCD readout shall display normal source and emergency source availability.

19. Include (2) time delay contacts that open simultaneously just (milliseconds) prior to transfer in either direction. These contacts close after a time delay upon transfer. Programmable 0-9999 seconds after transfer.

2.02 ELECTRICAL ENCLOSURE CABINETS

- A. Provide a free standing heavy-duty stainless-steel weather-tight and corrosion resistant custom fabricated electrical two door cabinet enclosure with sealed neoprene gasketing around all edges of the door. Cabinet enclosures shall be made of 14 gauge steel. The enclosure shall have the minimum dimensions as shown on the drawings. Actual sizes of the enclosures and lengths of the enclosures may be larger to incorporate all of the required equipment. The Contractor is responsible to properly size the control cabinet required at no additional cost to the Owner. Submit cabinet layout drawing with all dimensions shown for all installed devices.
- B. The enclosures shall have a 2-door configuration with single post in the middle of the enclosure for door latches. Doors shall have vault type operating handles with three point catch. The doors shall be fully gasketed with opening of sufficient size to permit ready removal of any of the equipment installed in the compartments. Doors shall have provisions for pad locking.
- C. Enclosure shall have a natural mill finish.
- D. Enclosures shall have a sidewall mounted exhaust fan and intake louvers on the opposite sidewall. Ventilation louvers shall be equipped with filters, fan shall be equipped with a thermostat.
- E. Heavy duty padlock with six sets of keys for each lock shall be furnished. Padlocks shall have forged brass case with brass shackle. Shackle shall be $\frac{5}{16}$ inch diameter with $2\frac{1}{2}$ inch clearance. Locks shall be No. 3841 as manufactured by Yale, or equal by Corbin.
- F. Enclosure roof shall slant to the rear of the enclosure. Drip shield shall extend over door opening. All exposed hardware shall be Type 316 stainless steel.
- G. Cabinet enclosures shall be leveled and bolted to a concrete pad using Type 316 stainless steel hardware. Conduits shall enter through the open bottom entry.
- H. In the cabinet enclosure provide a linear LED light with light switch, a dedicated 120V receptacles for owner provided heater, ground bus, a duplex 120 Volt and weather-proof convenience outlet.

2.03 SURGE PROTECTION DEVICE (SPD)

- A. Electrical Service SPD
 1. Certify unit listed to UL 1449, 4th Edition.

2. SPD shall be UL labeled as Type 1, intended for use without need for external or supplemental overcurrent devices. Every metal oxide varistors shall be self-protected.
3. SPD to be totally enclosed in a plastic NEMA 4X surface mounted enclosure and phase phase/line LEDs.
4. Minimum surge current capability (single pulse rated) per phase shall be 50 0kA
5. Voltage Protection Ratings (VPRs) shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
120/208-240	700V	1200V	1200V	800V
6. Maximum Continuous Operating Voltage (MCOV):

System Voltage	MCOV
120/208-240	150V
7. SPD shall be installed per manufacturer’s installation instructions with lead lengths as short (less than 24”) and straight as possible. Gently twist conductors together.

2.04 DISCONNECT SWITCHES (VISIBLE BLADE TYPE)

- A. Visible blade type disconnect switches shall be heavy-duty, quick-make, quick-break, visible blades, 600 Volt, 3 pole with full cover interlock.
- B. Enclosure shall meet the area NEMA designation for which they are located.
- C. NEMA Type 12, 4X and 8 enclosures shall be as specified herein.
- D. Provide service entrance rated disconnect switches for all feeders originating from an outdoor generator source.
- E. Disconnect switches shall be as manufactured by Eaton Co., Square D, or General Electric Co.

2.05 ENCLOSED CIRCUIT BREAKERS

- A. Circuit breakers shall be molded case, three pole unless otherwise noted, with voltage rating as required. Ampere rating shall be as shown on the drawings. Provide with service entrance rating where required.

- B. Main breaker shall be solid state with digital trip and adjustable trip setting with LED on face of breaker providing amps per phase. Provide auxiliary contacts for trip status to remote alarm.
- C. The interrupting capacity shall be not less than 65,000 Amperes, RMS symmetrical at 480V AC.
- D. All circuit breakers with 225 Ampere frames and larger shall have interchangeable trips.
- E. Enclosure shall meet the area NEMA designation for which they are located.
- F. NEMA Type 12, 4X and 8 enclosures shall be as specified herein.

2.06 ENCLOSURE TYPE

- A. NEMA Type 1 and Type 12 shall be general purpose sheet steel.
- B. NEMA Type 4X shall be cast iron or stainless steel.
- C. NEMA Type 7 and Type 8 shall be cast iron.
- D. All metal enclosures shall be finish painted over a rust inhibiting primer.

2.07 WIREWAY

- A. Wireway shall be steel.
- B. Wireway shall be manufactured by General Electric Co., or equal by Siemens Corp or Hoffman Enclosures.

2.08 NAMEPLATES

- A. Nameplates shall be provided for all special purpose tumbler switches, disconnect switches, remote control stations, motor starters, time clocks, panelboards, terminal cabinet, etc. to designate the equipment controlled and function.
- B. Nameplates shall be black and white laminated, phenolic material having engraved letters approximately 1/4 inch high, extending through the black face into the white layer.
- C. Nameplates shall be attached to the panel by self-tapping stainless steel screws or rivets.

2.09 METER SOCKET

- A. Provide a utility meter socket in a NEMA 3R enclosure with HASP cover provision of the type approved by the utility company.
- B. Meter Socket shall be 7 terminal, 200 Amp continuous rated, self-contained ringless type meter socket with a manual single handled bypass with locking jaw and safety arc shield.

2.10 MAGNETIC DOOR SWITCHES

- A. The switch mechanism with a SPDT contact shall have a minimum gap of 0.8-inch without internal adjustment.
- B. The switch element shall be housed in a total enclosed aluminum NEMA 4X housing.
- C. Conductors running from the door switch to alarm circuits shall be integral with switch and housed within a 3' stainless steel flexible armored cord.
- D. The armored cord shall terminate in a junction box or other enclosure and shall be mechanically secured by clamps or bushings. The conductors and the armored cord shall experience no mechanical strain as the door is removed from fully open to closed.
- E. The switch shall be type 2707 series by Edwards Signaling & Security System or equal by others.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. All field mounted devices shall be mounted four feet-six inches above the finished floor or grade. Devices shall be adequately supported on walls, columns or other supports. The Contractor shall furnish and install channel iron imbedded in the ground or floor to support devices where necessary.
- B. All control equipment shall be identified as to the equipment it controls. Provide lamacoid nameplates at all equipment.

3.02 TESTS AND CHECKS

- A. The following minimum tests and checks shall be made before energizing the automatic transfer switch.
 - 1. Perform insulation resistance tests phase-to-phase and phase-to-ground with switch in both source positions. The Insulation resistance test voltages and minimum values to be in accordance with manufacturer's published data.
 - 2. Measure contact resistance in normal and alternate source position.

3. Determine contact resistance in micro-ohms. Investigate any value exceeding 500 micro-ohms or any values which deviate from adjacent poles by more than fifty percent (50%).

- END OF SECTION -

SECTION 16120

WIRES AND CABLES

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes the furnishing, installing and testing of all wire, cable and appurtenances as specified herein and as shown on the drawings. All wiring of a given type shall be the product of one manufacturer.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Wire
 - 2. Cable
 - 3. Terminations
 - 4. Lugs
 - 5. Wire and Cable Markers

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

- A. Wire for branch circuits shall be Type XHHW or THWN-THHN.
- B. Wire for the service and pump feeders shall be Type XHHW.
- C. Single conductor wire for control, indication and metering shall be Type THWN/THHN No. 12 or 14 AWG, stranded.
- D. Multi-conductor control cable shall be used for the underground system and shall be No. 12 or 14 AWG, stranded with an overall jacket.
- E. Wire for process instrumentation shall be twisted shielded pairs No. 16 AWG, stranded.
- F. Ground wires shall be Type THW, green. Bare ground wires shall be soft drawn copper, 98 percent conductivity.

1.05 MINIMUM SIZES

- A. Except for control and signal wiring, no wire smaller than number 12 AWG shall be used.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Wires and cables shall be of annealed, 98 percent conductivity, soft drawn copper.
- B. All conductors No. 8 AWG and larger sizes shall be stranded.

2.02 600 VOLT WIRE

- A. Type XHHW shall be cross-linked polyethylene, as manufactured by Prysmian Cable Corp., Collyer Insulated Wire Co., The Okonite Co. or equal.
- B. Type THWN/THHN shall be as manufactured by Prysmian Cable Corp., Collyer Insulated Wire Co., The Okonite Co. or equal.
- C. Multi-conductor control cable shall be stranded, 600 Volt, cross-linked polyethylene insulated, neoprene jacketed, as manufactured by Allied Wire and Cable, or equal.

2.03 INSTRUMENTATION CABLE

- A. Process instrumentation wire shall be twisted pair, 600 Volts, polyethylene insulated, aluminum tape, tinned copper braid shielded, polyvinyl chloride jacketed, as manufactured by Okonite Co., Belden Corp., or equal.

2.04 CONNECTORS AND TERMINAL LUGS

- A. Splices for No. 10 or No. 12 A.W.G. solid wires, such as for lighting branch circuits, shall be made with insulated wire connectors.
- B. Connectors and terminal lugs on wires No. 8 A.W.G. and larger shall be of the mechanical or clamp type.

2.05 WIRE AND CABLE MARKERS

- A. Wire and cable markers shall be “Omni-Grip” as manufactured by W.H. Brady Co., or equal.
- B. Wire and cables with diameters exceeding the capacity of the “Omni-Grip” shall be marked with pre-printed, self-adhesive vinyl tapes as manufactured by W.H. Brady Co., T&B Fasteners Inc., or equal.
- C. The "to" and "from" destinations shall be clearly identified on each cable at each termination and within manholes, pull boxes and junction boxes.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. All conductors shall be carefully handled to avoid kinks or damage to insulation.
- B. All wires, cables and each conductor of multi-conductor cables (except lighting and receptacle wiring) shall be uniquely identified at each end with wire and cable markers.
 - 1. Where wiring originates from a motor control center or process control panel the wire identification number shall incorporate the terminal numbers used in the control center or panel and a number to identify the motor control center or panel.
 - 2. Wires shall be identified at both ends and at intermediate junction boxes, terminal cabinets, etc. Wire identification numbers shall be unique.
 - 3. A typed list of the numbers used at each motor control center and control cabinet shall be submitted with the as built drawings.
- C. Lubrications shall be used to facilitate wire pulling. Lubricants shall be U.L. approved for use with the insulation specified.
- D. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.
- E. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only shielded instrumentation wire.
- F. Shielding on instrumentation wire shall be grounded at the transmitter end only.
- G. Each branch circuit shall have a dedicated neutral.
- H. Cables penetrating fire rated floors, walls, etc. shall be fireproofed. Fireproofing material shall be U.L. classified for three hour fire rating. Fire-proofing system shall be as manufactured by 3M Co., Thomas & Betts, or equal.
- I. Power conductors (other than lighting & receptacle) shall be run continuous and splicing should be kept to a minimum. The Engineer should be informed of where splices will occur.

3.02 TESTS

- A. All 600 Volt wire insulation shall be tested with a megohm meter after installation. Tests shall be made at not less than 500 Volts. Submit a written test report of the results to the Engineer.

- END OF SECTION -

SECTION 16130

RACEWAYS AND FITTINGS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes the furnishing and installing of complete raceway systems as specified herein and as shown on the drawings.
- B. All raceway systems shall be complete with fittings, boxes or cabinets, and necessary connections to result in a complete system.
- C. Aluminum materials shall not be used.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Raceways.
 - 2. Boxes and Fittings.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

- A. Except where otherwise shown on the drawings, or hereinafter specified, all raceways installed exposed shall be rigid heavy wall galvanized steel conduit.
- C. PVC coated galvanized rigid steel conduit shall be used within the wet well.
- D. PVC Schedule 40 conduit shall be used underground.
- E. Raceway between components within the electrical enclosure shall be Liquidtight, Flexible Metal Conduit.
- F. When routing signal cables in raceways, maintain 12” spacing from power raceways and only cross at a 90 degree angle.

- G. Unless otherwise specified or shown on the drawings, all boxes shall be metal.
- I. Unless otherwise specified or shown on the drawings, exposed switch, outlet and control station boxes and fittings shall be cast or malleable iron.
- J. Terminal boxes, cabinets, junction boxes, pull boxes and wireways used in areas designated as NEMA 4X shall be stainless steel 316, gasketed.
- K. Conduit wall seals shall be used where conduits penetrate walls and floors or at other locations shown on the drawings.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Rigid Conduit
 - 1. Rigid heavy wall steel conduit shall be hot-dipped galvanized as manufactured by the Youngstown Sheet and Tube Co., Allied Tube and Conduit Corp., Wheeling-Pittsburgh Steel Corp., or equal.
 - 2. PVC conduit used underground shall be rigid polyvinyl chloride Schedule 40 as manufactured by Carlon, Phillips Petroleum Co., Triangle Pipe & Tube Co., Inc., or equal.
 - 3. PVC coated rigid steel conduit shall have a 0.040 inch thick, polyvinyl chloride coating permanently bonded to hot-dipped galvanized steel conduit, as manufactured by Calbond, Ocal, Robroy Industries, or equal.
- B. Liquidtight, Flexible Metal Conduit, Couplings and Fittings.
 - 1. Liquidtight, flexible metal conduit shall be Sealtite, Type UA, as manufactured by Anaconda American Brass Co., or equal by American Flexible Conduit Co., Inc., or equal.
 - 2. Fittings used with flexible conduit shall be of the screw-in type as manufactured by Thomas and Betts Co., Crouse-Hinds Co., O.Z. Manufacturing Co., or equal.
- D. Flexible couplings shall be as manufactured by Crouse-Hinds Co., Appleton Electric Co., O.Z. Manufacturing Co., or equal.
- E. Boxes and Fittings
 - 1. Pressed steel switch and outlet boxes shall be hot-dipped galvanized as manufactured by Raco Manufacturing Co., Adalet Co., O.Z. Manufacturing Co., or equal.

2. All boxes including, but not limited to, terminal boxes, junction boxes and pull boxes shall be sheet steel unless otherwise shown on the drawings. Boxes shall be galvanized and have continuously welded seams. Welds shall be ground smooth and galvanized. Box bodies shall be flanged and shall not have holes or knockouts. Box bodies shall not be less than 14 gauge metal and covers shall not be less than 12 gauge metal. Covers shall be gasketed and fastened with stainless steel screws. Boxes shall be as manufactured by Hoffman Engineering Co. or equal.
3. All boxes and fittings used with PVC coated conduit shall be furnished with a PVC coating bonded to the metal. The tensile strength of the bond shall be not less than 2,000 pounds.
4. Cast or malleable iron boxes and fittings shall be galvanized with cast galvanized covers and corrosion-proof screws as manufactured by the Crouse-Hinds Co., Appleton Electric Co., O.Z. Manufacturing Co., or equal.
5. PVC fittings shall be as manufactured by Carlon, An Indian Head Co., O.Z. Manufacturing Co., or equal.
6. Steel elbows and couplings shall be hot-dipped galvanized. Elbows and couplings used with PVC coated conduit shall be furnished with a PVC coating bonded to the steel, the same thickness as used on the coated steel conduit.
7. Conduit hubs shall be as manufactured by Myers Electric Products, Inc., Raco Div., O.Z. Manufacturing Co., or equal.
8. Conduit wall seals shall be Type WSK as manufactured by O.Z. Manufacturing, Co., or equal by Link Seal Co.
9. Combination expansion-deflection fittings shall be Type XD as manufactured by Crouse-Hinds Co., or equal by Appleton Electric Co., O.Z. Manufacturing Co.
10. Conduit seal bushings shall be Type CSB as manufactured by O.Z. Manufacturing Co., or equal by Crouse-Hinds Co.
11. Explosion proof conduit seals shall be Type EYS as manufactured by O.Z. Manufacturing Co., or equal by Crouse-Hinds Co. and Appleton Electric Co.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. No conduit smaller than 3/4 inch electrical trade size shall be used, nor shall any have more than three 90 degree bends in any one run. Approved factory elbows shall be used when sharper bends are necessary. Pull boxes shall be provided as required or directed.

- B. No wire shall be pulled until the conduit system is complete in all details; in the case of concealed work, until all rough plastering or masonry has been completed; in the case of exposed work, until the conduit system has been completed in every detail.
- C. The ends of all conduits shall be tightly plugged to exclude dust and moisture while the buildings are under construction.
- D. Conduit supports shall be spaced at intervals of eight feet or less, as required to obtain rigid construction.
- E. Single conduits shall be supported by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the surface. Plastic "CLIC" system supports are not acceptable.
- F. All conduits on exposed shall be run perfectly straight and true.
- G. Conduit terminating in pressed steel boxes shall have double locknuts and insulated bushings.
- H. PVC conduits shall be installed using a fusing cement process. Conduits shall be water tight.
- I. Conduit terminating in gasketed enclosures shall be terminated with conduit hubs.
- J. Metallic heavy wall conduits shall be installed using threaded fittings. Threadless fittings may be used in isolated instances when approved by the Engineer.
- K. Liquidtight flexible metal conduit shall be used for all motor terminations and other equipment where vibration is present.
- L. PVC coated rigid steel conduits shall extend a minimum of 12 inches above finished slabs. Conduits penetrating walls shall be caulked gas tight on both sides.
- M. When a conduit has to be cut in the field, it shall be cut square using a hand or power hacksaw cutter, or an approved pipe cutter using knives. The use of pipe cutter wheels will not be permitted. The cut ends of the field cut conduit shall be reamed to remove burrs and sharp edges. Where threads have to be cut on conduit, the threads shall have the same effective length and shall have the same thread dimensions and taper as specified for factory cut threads on conduits. Field cut threads shall be protected by a field applied cold galvanizing compound.
- N. Conduits entering structures below grade shall be furnished with a conduit seal bushing.
- O. Where ducts terminate at panelboards, terminal cabinets, etc. panel of sufficient width and depth shall be provided to maintain the 2 inch spacing between ducts or wireways shall be provided below panels, cabinets, etc.
- P. A ground wire shall be run in all runs of PVC conduit.

- Q. All bends in PVC conduit shall be made using a hotbox and bending guide tool.
- R. Conduits run underground below the highest known ground water level shall not enter buildings below this groundwater level without first being run through a drain manhole, handhole, or exterior pull box.

- END OF SECTION -

SECTION 16442

PANELBOARDS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes the furnishing and installing of all panelboards as specified herein and as shown on the drawings. All panelboards shall be provided with the applicable NEMA enclosure in accordance with the Electrical Specifications, NEMA Type 1 panels can be provided in lieu of NEMA Type 12.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Panelboards, including construction details and enclosures
 - 2. Terminals and lugs
 - 3. Trim
 - 4. Buses
 - 5. Circuit Breakers
 - 6. Groundfault Circuit Interrupter

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

- A. Panelboard ratings shall be as shown on the drawings. All panelboards shall be rated for the intended voltage.
- B. Panelboards shall be in accordance with the Underwriter Laboratories, Inc. “Standard for Panelboards” and “Standard for Cabinets and Boxes” and shall be so labeled where procedures exist. Panelboards shall also comply with NEMA Standard for Panelboards and the National Electrical Code.

PART 2 – PRODUCTS

2.01 PANELBOARD CONSTRUCTION

- A. Interiors
 - 1. All interiors shall be completely factory assembled with circuit breakers, wire connectors, and buses. All wire connectors, except screw terminals, shall be of

the anti-turn solderless type and all shall be suitable for copper wire of the sizes indicated.

2. Interiors shall be designed such that circuit breakers can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be such that circuits may be changed without machining, drilling or tapping.
3. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. Branch circuits shall be numbered by the manufacturer.
4. A factory provided label shall be provided listing panel type, number of circuit breakers and ratings.
5. The main breaker shall be at the top or bottom of the bus construction and not a branch breaker.

B. Buses

1. Main bus shall be copper. Full size neutral bars shall be included. Phase bussing shall be full height without reduction. Cross connectors shall be copper. All buses shall be tinned.
2. Main bus shall be distribution phase sequence type configuration to allow installation of two or three pole circuit breakers at any location.
3. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection.
4. Spaces for future circuit breakers shall be bussed for the maximum device that can be fitted into them.
5. Solderless main lugs or main circuit breakers shall be furnished as shown on the drawings.
6. Bus bracing to be at least equal to the interrupting rating of lowest rated circuit breaker installed in panel. Series rated breakers and panels shall not be acceptable.

C. Boxes

1. Boxes shall be made from galvanized code gauge steel having multiple knockouts unless otherwise noted. Surface mounted boxes shall be painted to match the trim. Boxes shall be of sufficient size to provide a minimum gutter space of four inches on all sides.
2. Surface mounted boxes shall have an internal and external finish as specified herein. Surface mounted boxes shall be field punched for conduit entrances.
3. At least four interior mounting studs shall be provided.
4. Panelboards shall be "door-in-door" construction.

D. Trim

1. Hinged door-in-door construction shall enclose all circuit breaker handles and shall be included in all panel trims.
2. Doors shall have semi flush type cylinder lock and catch, except that doors over 48 inch in height shall have a vault handle and three point catch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Two keys shall be supplied for each lock. All locks shall be keyed alike. A directory frame and card having a transparent cover shall be furnished on each door.
3. Trims shall be fabricated from code gauge sheet steel.
4. All exterior and interior steel surfaces of NEMA 1, 1A, 3R and 12 panelboards shall be properly cleaned and finished with ANSI Z55.1, No. 61 light gray paint over a rust-inhibiting phosphatized coating. The finish paint shall be of a type to which field applied paint will adhere.
5. Trims for flush panels shall overlap the box by at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be fastened with quarter turn clamps.

E. Manufacturer

1. 120/240 Volt, single phase, 3 wire and 120/208 Volt, three phase, 4-wire branch circuit panelboards rated for 200 Amps and less shall load center type as manufactured by Eaton, or equal by Square D and General Electrical.

2.02 CIRCUIT BREAKERS

- A. Panelboards shall be equipped with circuit breakers with frame size and trip settings as shown on the drawings. Circuit breaker mounting shall not exceed 78 inches above floor.
- B. Circuit breakers shall be molded case, bolt-in type.
- C. Circuit breakers shall have an interrupting capacity as shown on the Electrical Contract Drawings.
- D. Main circuit breaker shall be attached to the main vertical bus.

2.03 GROUND FAULT CIRCUIT INTERRUPTER (GFCI)

- A. GFCI shall be provided for circuits where indicated on the drawings. GFCI units shall be molded case, bolt-on breakers, incorporating a solid state ground fault interrupter circuit insulated and isolated from the breaker mechanism. The unit shall be U.L. listed Class A Group I device (5 milliamp sensitivity, 25 millisecond trip time), and an interrupting capacity matching the circuit breakers in the panelboards.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Boxes for surface mounted panelboards shall be mounted so there is at least ½ inch air space between the box and the wall.
- B. Circuit directories shall be typed identifying location and nature of load served.
- C. Panelboards installed in areas with finished walls shall be installed recessed into the wall with the front of the panel flush with the finished wall.

- END OF SECTION -

SECTION 16500

LIGHTING SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes the furnishing and installing of complete lighting systems including panelboards, transformers, lighting fixtures, receptacles, switches, contactors, clocks and all accessories and appurtenances required as specified herein and as shown on the drawings.

1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Light Switches
 - 2. Receptacles
 - 3. Lighting Fixtures
 - 4. Device Plates

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

- A. All lighting fixtures shall be in accordance with the National Electrical Code and shall be constructed in accordance with the Underwriters Laboratories “Standards for Safety, Electric Lighting Fixtures.” All lighting fixtures shall be Underwriters Laboratories labeled.

PART 2 – PRODUCTS

2.01 LIGHT SWITCHES

- A. NEMA WD 1, UL 20, Heavy-Duty, AC only general-use toggle switch.
- B. Rated 20 Amperes, 120/277 Volts for inductive and resistive loads.
- C. Motor rated up to 80 percent of ampere rating.
- D. Totally enclosed in a phenolic base and cover.

2.02 RECEPTACLES

- A. NEMA WD 1, UL 498, Heavy-duty general use receptacle.
- B. GFCI Receptacle: UL 943, Convenience receptacle with integral ground fault circuit interrupter and indication light that is lighted when device is not tripped.
- C. NEMA WD 6, straight blade type for rated current and phases as indicated on drawings.
- D. Weatherproof Cover Plate: NEMA 3R, thermoplastic white use type covers by Hubbell or equal.

2.03 DEVICE PLATES

- A. Plates for shall be of the required number of gangs for the application involved and shall be Type 302 (18-8) high nickel stainless steel of the same manufacturer as the device.

2.04 LIGHTING FIXTURES

- A. Lighting fixture shall be LED illuminated and of type as shown on the drawings. The catalog numbers listed are given as a guide to the design and quality of fixture desired. Equivalent designs and equal quality fixtures of other manufacturers will be acceptable.
- B. The fixture shall be tested to IESNA LM-79-08 and LM-80 Testing Standards at 25° C ambient temperature
- C. The LED package shall be designed around the lumen maintenance of 87% at 60,000 hrs. and is to be expected to achieve L70 at 100,000 hrs.
- D. The Light Engine shall be a high efficacy LED light engine equipped with brand-name LEDs available in outputs of 100%, 85%, 70% and 55%.
- E. The LED Drivers shall be Electronic Class 2, high efficiency, with the following power factor correction (PFC):
 - 1. Standard Non-Dimming Driver (PFC>0.95).
 - 2. Dimming Drivers (PFC>0.90).

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Each fixture shall be a completely finished unit with all components, mounting and/or hanging devices necessary, for the proper installation of the particular fixture in its designated location and shall be completely wired ready for Connection to the branch circuit wires at the outlet. All pendant mounted fixtures shall be mounted plumb with floors and walls.

3.02 CLEANING UP

- A. All fixtures shall be left in a clean condition, free of dirt and defects, before acceptance by the Engineer.

- END OF SECTION -

SECTION 16612

DIESEL ENGINE GENERATORS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes all labor, materials, tools, equipment and incidentals necessary to furnish and install, put in operation and field test diesel engine driven generator units with sound attenuated weatherproof enclosure and doubled wall base tank of the size and rating as specified herein and on the Drawings.

1.02 SUBMITTALS

- A. Shop Drawings and/or brochures shall be submitted to the Engineer in accordance with Section 01300.
- B. Submit all pertinent technical data including but not limited, to the following:
 - 1. Manufacturer and model of engine and generator
 - 2. Rated capacity B.H.P.
 - 3. Generator
 - 4. Generator KVA, KW and P.F. rating
 - 5. Voltage
 - 6. Class insulation
 - 7. Temperature rise above 40 degree C ambient
 - 8. Generator efficiency and fuel consumption at full load, 3/4 load and 1/2 load
 - 9. Operating weight of complete unit
 - 10. Exhaust piping
 - 11. Double walled base tank
 - 12. Battery and charger
 - 13. Auxiliary system power requirements and wiring diagrams
 - 14. Enclosure with all conduit openings for system operation identified.

- C. Manufacturer's certified test record. The test record shall show the generator performance and frequency regulation to satisfy the requirements specified herein, and shall also show fuel consumption rates at 1/2 load, 3/4 load and full rated load.
- D. Submit all other data specified in this section and as outlined in Section 01300.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

- A. The engine generator units shall comply with the requirements of the Federal Environmental Protection Agency, State of Massachusetts Department of Environmental Protection, and NFPA 70.
- B. The engine generator unit shall be arranged for automatic starting and stopping on failure of, and restoration of the normal source of power, and for automatic load transfer, but not including the automatic load transfer switch which will be furnished separately.
- C. The engine generator unit shall include, but not be limited to excitation system, controls, keep warm system, cooling system, silencer, starting batteries, charger, and all essential and desirable appurtenances whether specifically mentioned in this specification or not.
- D. The system described herein, including but not necessarily limited to the engine generator set, engine auxiliaries, batteries and engine generator control panels shall be furnished by a single supplier who is regularly engaged in the production of diesel fueled engine driven generators.
- E. The voltage regulation shall be within plus or minus two percent from no load to full rated load. On application or removal of full rated load in one step, the transient voltage dip or overshoot shall not exceed twenty percent of rated voltage. Frequency regulation shall be within 3 Hertz from no load to full load.
- F. The voltage regulator shall be insensitive to severe load induced waveshape distortion from SCR or thyristor circuits such as those used in battery charging (UPS) and motor speed control equipment. This SCR immune regulator shall not reduce the motor starting capabilities as specified herein.
- G. Engine generator unit of not less than KW rating indicated on the contract drawings, three phase, 60 Hertz, 277/480 Volts, 4 wire alternating current generator shall be furnished for the Industrial Pump Station.
- H. Engine generator unit of not less than KW rating indicated on the contract drawings, three phase, 60 Hertz, 120/208 Volts, 4 wire alternating current generator shall be furnished for the Myles Standish Pump Station and the Stevens Street Pump Station.

- I. Engine generator unit of not less than KW rating indicated on the contract drawings, single phase, 60 Hertz, 120/240 Volts, 3 wire alternating current generator shall be furnished for the Davis Street Pump Station.
- J. The engine generator units shall be completely prewired and piped so that only field connections to a master terminal strip for control, auxiliaries and alarms, and power connections to a molded case line circuit breaker and fuel fill and vent line connections will be required.
- K. The engine generator unit and associated auxiliaries systems and components shall be skid mounted and installed outdoors.

1.05 QUALIFICATIONS

- A. The generator units shall be the standard product, as modified by these Specifications, of one of the following manufacturer listed below. Engine generator unit shall be a standard production model of proven ability and shall be designed, constructed, and installed in accordance with the best practice and methods. In addition, the manufacturer shall maintain a permanent service organization and supply of spare parts as necessary to provide adequate service within 60 miles of the site. The design basis for the generator sizes including the enclosure and base tank are based on Kohler units. Due to constraints on the sites, units by the other manufactures must not exceed the dimensions shown on scaled contract drawings by more than 10% which may require custom fabricated enclosures by the manufacture.
 - 1. Caterpillar
 - 2. Cummins
 - 3. Kohler
- B. The engine generators shall be a factory assembled unit specifically designed and fitted for operation on diesel fuel. The engine generator unit shall be free from injurious torsional or other vibration, and shall be assembled on an adequate steel subbase suitable for mounting on vibration isolation pads, on a flat concrete surface which is suitable for supporting the weight of the unit. The vibration installation material shall be furnished with the engine generator unit.
- C. The engine generator unit will be installed in Taunton, MA and rated for use at this location's elevation level. Outdoor enclosed units shall be provided with heating and cooling as required to maintain the generator set operational within the temperature limits of all devices and equipment. The engine generator unit shall be suitable for continuous operation at any temperature between 0 and 110 degree F at its full load rating and at 80 percent power factor.
- D. The engine generator unit shall be designed and built in accordance with the latest standards of IEEE, NEMA, ANSI and ASME.
- E. The engine generator unit shall be designed to minimize the danger of accidents to operating and maintenance personnel. The manufacturer shall, prior to shipment, verify that all electrical connections are tight and that circuits are isolated, that on-set piping

connections are well-made, and that standard safety equipment is included and functions according to design.

1.06 ENGINE GENERATOR UNIT PERFORMANCE

- A. The engine generator unit shall maintain rated frequency from no load to full rated load.
- B. The voltage regulation shall be as specified herein and recovery to steady state operation shall be within two seconds.
- C. Stable or steady state operation is defined as operation with terminal voltage remaining constant within plus or minus one percent of rated voltage. A rheostat shall provide a minimum of plus or minus five percent voltage adjustment from rated voltage.
- D. Frequency regulation shall be maintained within 2½ percent of rated frequency from no load to full load. The steady state frequency shall be within 0.5 percent of rated frequency.
- E. The engine shall be equipped with a electronic isochronous governor capable of maintaining the engine speed from no load to full load within plus or minus .25 percent of the synchronous speed.

1.07 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.
- B. Protect material and equipment, in accordance with the manufacturers recommended storage procedures, before, during, and after installation. Stored items shall be protected from the weather and contamination. During installation, piping and similar openings shall be capped to keep out dirt and other foreign matter.

1.08 WARRANTY/SERVICE

- A. The manufacturer's and dealers Extended Service Coverage shall in no event be for a period of less than five (5) years from date of Owner/Engineer's acceptance of the system and shall include repair parts, labor, travel expense necessary for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of maintenance and repair. Applicable deductible costs applying only after the first year shall be specified in the manufacturer's warranty and not exceed \$500 per site visit. Submittals received without written warranties as specified will be rejected in their entirety. Warranty and maintenance shall be issued and executed by the dealer and may not be subcontracted.
- B. The generator set supplier shall have factory trained service representatives and tooling necessary to install, test maintain, and repair all provided equipment and shall be located within 150 miles of the customer's site.

PART 2 – PRODUCTS

2.01 ENGINE

- A. The engine shall be diesel fueled, four (4) cycle, water-cooled, while operating with nominal speed not exceeding 1800 RPM. The engine shall meet applicable EPA non-road mobile regulations and/or the EPA NSPS rule for stationary reciprocating compression ignition engines. Additionally, the engine shall comply with the State and Federal emission regulations at the time of installation/commissioning. Actual engine emissions values must be in compliance with applicable EPA emissions standards per ISO 8178 Emissions Cycle at specified ekW/bHP rating.
- B. The engine shall be furnished with thermostatically controlled jacket water heaters of the size recommended by the supplier. Heaters for units rated less than 150KW shall be rated for operation at 120 Volts, and 208 Volts for units 150KW and greater.
- C. The oil sump will be fitted with pipe nipples, a ball valve, and an extension oil drain.
- D. The engine shall be provided with a governor which maintains the frequency within a bandwidth of the rated frequency, over a steady-state load range of zero to 100% of rated output capacity. The governor shall be configured for safe manual adjustment of the speed/frequency during operation of the engine-generator set, without special tools, from 90 to 110% of the rated speed/frequency, over a steady state load range of 0 to 110% or rated capacity.
 - 1. Steady state speed band, +/- 0.25% of rated speed.
 - 2. Internal oil pump, relief valve and accumulator controls governor operating pressure.
 - 3. Manual speed adjustment knob at top of unit.
 - 4. Positive locking to allow manual speed adjustment.

2.02 COOLING SYSTEM

- A. The engine shall be furnished with a unit mounted radiator. The radiator shall be of sufficient size to cool the water when ambient temperature is 100 degrees F. and the engine generator unit is operating at full rated load continuously.
- B. Cooling system shall further include water cooled manifolds, pusher fans and high temperature cutout. Provide radiator duct connector complete with suitable gasket, bolts and nuts. The cooling system shall be furnished with sufficient antifreeze solution to protect the cooling system with ambient air temperature down to minus fifty degrees F.
- C. Provide an anti-freeze treatment as recommended by the manufacturer for protection against corrosion and scale formation. The anti-freeze treatment shall be compatible with

the antifreeze solution. The anti-freeze will be long life environmentally friendly polypropylene glycol. The concentration will be as recommended by the manufacturer.

2.03 FUEL SYSTEM

- A. The engine shall be furnished with filter, fuel pressure gage and engine priming pump.
- B. The engine-generator unit shall be furnished with an approximate 25 inch high, double-walled fuel base-tank with leak detection and fuel capacity for 48 hours of generator operation at full load. Tank shall be constructed of heavy gauge steel; epoxy coated interior, and Housing surfaces shall have a corrosion resistant epoxy based hardened rubberized coating.
 - 1. Tank shall conform to NFPA 30 and NFPA 47.
 - 2. The diesel fuel oil tank shall have tappings for fuel supply and return. It shall be equipped with a suitable vent cap. The fill pipe shall be extended to the exterior wall and easily accessible and lockable.
 - 3. The tank shall be dual wall constructed of steel and mounted directly to the generator set skid, and shall be provided with low fuel and leak detection alarms and dry contacts. For added protection the rupture basin portion of the tank shall have a leak monitoring system utilizing a non-toxic, non-volatile liquid to determine integrity of external rupture basin wall. This shall be coordinated to operate with floats and sensors of the fuel tank.
 - 4. An 8 gallon overflow tank shall be furnished at the generator fill. The generator shall be furnished with a 2 inch diesel vent fuel line. The diesel fuel tank shall be furnished with audible and visual alarms at the fill gauge.
 - 5. Vent and overflow piping to be provided.
 - 6. Fuel gauge.
 - 7. Provide tank openings to allow manual level measurement with stick gauges.

2.04 EXHAUST SILENCER

- A. The engine generator unit shall be provided with a critical type silencer including flexible exhaust fittings. Silencers shall be mounted so that its weight is not supported by the engine. Exhaust piping shall be sized as recommended by the manufacturer. Connection between engine and silencer shall be of the stainless steel flexible type.
- B. A flexible section shall be provided at each engine and an expansion joint at each muffler. Flexible sections and expansion joints shall have flanged connections. Flexible sections shall be made of convoluted seamless tube without joints or packing. Expansion joints shall be the bellows type. Expansion and flexible elements shall be stainless steel suitable for diesel-engine exhaust gas at the maximum exhaust temperature that is specified by the engine manufacturer. Expansion and flexible elements shall be capable

of absorbing vibration from the engine and compensation for thermal expansion and contraction.

- C. Horizontal sections of exhaust piping shall be sloped downward away from the engine to a drip leg for collection of condensate with drain valve and cap. Changes in direction shall be long radius. Exhaust piping, mufflers and silencers installed shall be insulated with 3 inches of calcium silicate insulation and covered with aluminum flashing to protect personnel.
- D. All portions of the exhaust system shall be insulated and covered with flashing.

2.05 STARTING SYSTEM

- A. The electric starting system shall consist of the following equipment:
 - 1. The engine shall have a two wire, direct current starter suitable for automatic starting through the load transfer switch.
 - 2. Batteries shall be of the lead-acid type. Batteries shall be guaranteed to have sufficient capacity when in a fully charged state to perform not less than five, 15 second cranks while in an ambient temperature of 0 degrees F without recharging.
 - 3. Current limiting type automatic battery charger conforming to UL 1236 shall be of the static type, magnetic amplifier control with led status lights, battery temperature compensation, and user adjustable parameters factory set to match battery charge curve. Charger to be completely automatic, charging rate to be determined by the state of the battery, and reducing to milliamp current on a fully charged battery. Charger shall be for 120 Volt, single phase, 60 Hertz A.C. input with an output of not less than 10 amperes. The charger shall be for the correct voltage for the battery, and specifically for charging a lead-acid battery and for panel mounting.

2.06 ALTERNATOR

- A. The alternator shall be single bearing, open, dripproof revolving field, four pole brushless type, permanently aligned to the engine by flexible disc coupling. Each unit shall be reconnectable type having nine leads and shall be factory connected for single phase, 3 wire, 60 Hertz. The rating of the unit shall be as indicated on the drawings.
- B. Alternators shall have Class F insulation and shall be furnished with Amortisseur windings. Alternators shall have a complete static automatic voltage regulator which will hold the voltage within plus or minus two percent from no load to full rated load. On application of rated load in one step, the transient voltage dip shall not exceed twenty percent. The generator windings shall be braced to withstand any possible short circuit stresses. Alternator shall be "Radio Interference Proof" (RIP) and "Telephone Influence Factor" (TIF) and shall be within the limits of Section 9, ANSI C50.12. Alternators shall have a rotating brushless exciter and rectifier.

- C. The alternator characteristics shall be matched to the torque characteristics of the engine in such a manner that with full load connected to the alternator terminals, the alternator will utilize all the available engine power without exceeding it at all speeds.
- D. The generator exciter shall be of the brushless type. Semiconductor rectifiers shall have a minimum safety factor of 300% for peak inverse voltage and forward current ratings for all operating conditions, including 110% generator output at 40 degrees C 104 degrees F ambient. The exciter and regulator in combination shall maintain generator-output voltage within the limits specified.
- E. Each generator shall be provided with a solid-state voltage regulator, separate from the exciter. The regulator shall maintain the voltage within a bandwidth of the rated voltage, over a steady-state load range of zero to 100% of rated output capacity. Regulator shall be configured for safe manual adjustment of the engine-generator voltage output without special tools, during operation, from 90 to 110% of the rated voltage over the steady state load range of 0 to 100% of rated output capacity. Regulation drift shall not exceed plus or minus 0.5% for an ambient temperature change of 20 degrees C. 68 degrees F.
- F. Alternators shall be furnished with 120V stator heater and controls.

2.07 CONTROLS

- A. The engine generator units shall be furnished with a shock resistant, engine mounted NFPA 110 compliant microprocessor based controller.
- B. Standard data available shall include:
 - 1. Jacket water temperature
 - 2. Lube oil temperature
 - 3. Lube oil pressure
 - 4. Battery voltage
 - 5. RPM
 - 6. A.C. Voltmeter
 - 7. A.C. Ammeter
 - 8. Frequency meter
 - 9. Elapsed time meter calibrated in hours and tenths of hours
- C. Accessories shall include:
 - 1. Current transformers.

2. Fuses
 3. Generator voltage regulator
 4. Voltage adjusting rheostat.
 5. Fault indication lights one each for:
 - a. low oil pressure
 - b. high water temperature
 - c. overspeed
 - d. overcrank (fail to start).
 6. Prewarn indication lights one each for:
 - a. low oil pressure
 - b. high water temperature.
 7. 90 DB (a) Audible alarm to sound on any fault or prewarn and an alarm silencer.
 8. Mode selector switch – "AUTO", "OFF", "MANUAL" with audible alarm when switch is not in "AUTO" position.
 9. Control power fuse.
 10. Fixed overcrank timer - four-10 second cranks shall be provided. After four cranks, the unit shall stop and an alarm initiated.
 11. Auxiliary contacts which close when engine is in operation. Contacts shall be rated 10 amperes and shall be used to interlock combustion and ventilation air dampers.
 12. Common failure relay
 13. Dry contact kit with the minimum following contact signals:
 - a. Engine Running
 - b. Engine Trouble
 - c. Battery Charger Alarm
 14. Engine sensors for low water temperature near low oil pressure, near high water temperature.
- D. In addition to the equipment included in the control panel described above, the unit shall include a power and control junction box mounted on the generator. This junction box shall include:
1. Power conductors terminated with pressure type ring connectors.

2. Neutral connection.
 3. Terminal block with marked connection points for all external control connections and for jacket heaters, etc.
 4. Molded case line circuit breaker with interrupting rating of 100 KA amperes RMS, electronic LSI, and ground fault relay alarm.
- E. Automatic shutdown shall be provided for each of the following conditions:
1. High jacket water temperature
 2. Low jacket water pressure
 3. Low lubricating oil pressure
 4. Engine overspeed
 5. Unit fail to start.
- F. Auxiliary normal open dry contacts shall be provided for remote transmission of unit failure.
- G. Provide a factory wired weather proof remote emergency stop pushbutton operator station mounted on the generator enclosure.

2.08 SUB-BASE

- A. The engine, generator and radiator shall be mounted on a structural steel base designed to maintain proper alignment. Vibration isolators shall be furnished of the size and type recommended by the supplier.

2.09 ENCLOSURE

- A. A sound-attenuated weather-protective housing shall be furnished. The housing shall enclose the complete unit and all related equipment (e.g. battery, battery charger, engine controls and control panel, etc). All components shall be wired and piped within the enclosure.
- B. The housing shall be constructed of 2mm formed aluminum (units less than 60KW) and less, 3.2mm formed aluminum (greater than 60KW), and shall include hinged locking access doors. Housing surfaces shall be prime painted with two coats of a rust resistant primer and finished with a dark green enamel paint.
- C. The housing shall be sound insulated, vandal proof, and padlocked. The resulting structure with engine-generator in operation shall not transmit noises more than db levels listed below at a distance of 23 feet from the generator in any direction. There shall be no Puretone. The generator set manufacturer shall choose the thickness of insulation to meet the aforementioned sound criteria.

1. Davis Street Pump Station – 65 db
 2. Industrial Pump Station – 75 db
 3. Myles Standish Pump Station – 65 db
 4. Stevens Street Pump Station – 65 db
- D. The housing shall be furnished with weather-protective fixed louvers, and weather-protective flanged door openings to insure weather-resistant construction.
- E. Stainless steel flexible exhaust sections shall be provided. Exhaust outlet shall be terminated with a “shanty cap” designed so to prevent entrance of rain into exhaust outlet. All handles, sheet metal screws, bolts, nuts, hinges, and other exterior hardware shall be stainless steel.
- F. Provide factory wired instruction detection style doors switches for each of the enclosure entry doors that shall be wired in series to one another and terminated at a junction box within the generator enclosure.

PART 3 – EXECUTION

3.01 MANUFACTURER'S SERVICES

- A. A minimum of one, eight-hour day shall be provided to supervise the installation and testing of the equipment furnished, to assist in start-up and train Owners maintenance personnel.
- B. A minimum of one, four hour day, not including travel time to and from the site, shall be used by a fully qualified field service engineer to make necessary adjustments and to provide operator training on the equipment furnished. This work shall occur after the equipment has been in operation and at the request of the owner, but not to exceed one year after the acceptance of the facility.

3.02 TESTS

- A. At least 48 hours prior to the load test, the manufacturer shall perform a pretest. The pretest shall be conducted in the presence of the Engineer. The pretest shall determine that the unit is ready for load testing and that all components are functioning correctly. All adjustment for tuning the unit shall be made during the pretest. If remedial work is required, the work shall be performed before the load test is conducted.
- B. Upon completion of the installation, the manufacturer of the equipment shall test the complete unit, at full load, using load banks, for four continuous hours. During the test, the following data shall be taken at 15 minute intervals:
1. Outside air temperature

2. Generator room temperature
 3. Oil pressure
 4. Oil temperature
 5. Jacket water temperature
 6. Battery charge rate
 7. Fuel pressure
 8. A.C. Volts
 9. A.C. Amps
 10. Frequency
 11. Kilowatts.
- C. Following the test, three successive simulated power outages shall be conducted using all connected building load.
- D. The equipment shall be left in good operating order and the settings of all alarm and shutdown devices verified.
- E. The diesel fuel required for testing shall be supplied by the electrical contractor, upon engineer acceptance of the tests results the electrical contractor shall fill the generator's base tank and make the unit completely ready for full operation.

3.03 OPERATION AND MAINTENANCE MANUALS

- A. Furnish Operation and Maintenance Manuals as specified in Section 01730.
- B. Maintenance instructions shall be furnished for batteries, to include simple and clear procedures for addition of liquids, maintaining cleanliness, proper ventilation, proper electrical connections.
- C. Maintenance instruction shall be furnished for engines, including recommended lubricants, coolants, etc., recommended maintenance intervals, and recommended ventilation requirements.
- D. The Operating manual shall be a simple starting and stopping procedure, with reference to shop drawings information for more complicated procedures.

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SECTION 16613

GASEOUS ENGINE GENERATORS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The work of this section includes all labor, materials, tools, equipment and incidentals necessary to furnish and install, put in operation and field test a natural gas engine driven generator unit with sound attenuated weatherproof enclosure of the size and rating as specified herein and on the Drawings.

1.02 SUBMITTALS

- A. Shop Drawings and/or brochures shall be submitted to the Engineer in accordance with Section 01300.
- B. Submit all pertinent technical data including but not limited, to the following:
 - 1. Manufacturer and model of engine and generator
 - 2. Rated capacity B.H.P.
 - 3. Generator
 - 4. Generator KVA, KW and P.F. rating
 - 5. Voltage
 - 6. Class insulation
 - 7. Temperature rise above 40 degree C ambient
 - 8. Generator efficiency and fuel consumption at full load, 3/4 load and 1/2 load
 - 9. Operating weight of complete unit
 - 10. Exhaust piping
 - 11. Battery and charger
 - 12. Auxiliary system power requirements and wiring diagrams
 - 13. Enclosure with all conduit openings for system operation identified.
- C. Manufacturer's certified test record. The test record shall show the generator performance and frequency regulation to satisfy the requirements specified herein, and shall also show fuel consumption rates at 1/2 load, 3/4 load and full rated load.

- D. Submit all other data specified in this section and as outlined in Section 01300.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600.
- B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

- A. The engine generator units shall comply with the requirements of the Federal Environmental Protection Agency, State of Massachusetts Department of Environmental Protection, and NFPA 70.
- B. The engine generator unit shall be arranged for automatic starting and stopping on failure of, and restoration of the normal source of power, and for automatic load transfer, but not including the automatic load transfer switch which will be furnished separately.
- C. The engine generator unit shall include, but not be limited to excitation system, controls, keep warm system, cooling system, silencer, starting batteries, charger, and all essential and desirable appurtenances whether specifically mentioned in this specification or not.
- D. The system described herein, including but not necessarily limited to the engine generator set, engine auxiliaries, batteries and engine generator control panels shall be furnished by a single supplier who is regularly engaged in the production of natural gas fueled engine driven generators.
- E. The voltage regulation shall be within plus or minus two percent from no load to full rated load. On application or removal of full rated load in one step, the transient voltage dip or overshoot shall not exceed twenty percent of rated voltage. Frequency regulation shall be within 3 Hertz from no load to full load.
- F. The voltage regulator shall be insensitive to severe load induced waveshape distortion from SCR or thyristor circuits such as those used in battery charging (UPS) and motor speed control equipment. This SCR immune regulator shall not reduce the motor starting capabilities as specified herein.
- G. Engine generator unit of not less than KW rating indicated on the contract drawings, single phase, 60 Hertz, 120/240 Volts, 3 wire alternating current generator shall be furnished for the School Street Pump Station.
- H. The engine generator units shall be completely prewired and piped so that only field connections to a master terminal strip for control, auxiliaries and alarms, and power connections to a molded case line circuit breaker and fuel fill and vent line connections will be required.
- I. The engine generator unit and associated auxiliaries systems and components shall be skid mounted and installed outdoors.

1.05 QUALIFICATIONS

- A. The generator units shall be the standard product, as modified by these Specifications, of one of the following manufacturer listed below. Engine generator unit shall be a standard production model of proven ability and shall be designed, constructed, and installed in accordance with the best practice and methods. In addition, the manufacturer shall maintain a permanent service organization and supply of spare parts as necessary to provide adequate service within 60 miles of the site. The design basis for the generator size including the enclosure is based on Kohler units. Due to constraints on the sites, units by the other manufactures must not exceed the dimensions shown on scaled contract drawings by more than 10% which may require custom fabricated enclosures by the manufacture.
1. Caterpillar
 2. Cummins
 3. Kohler
- B. The engine generators shall be a factory assembled unit specifically designed and fitted for operation on natural gas fuel. The engine generator unit shall be free from injurious torsional or other vibration, and shall be assembled on an adequate steel subbase suitable for mounting on vibration isolation pads, on a flat concrete surface which is suitable for supporting the weight of the unit. The vibration installation material shall be furnished with the engine generator unit.
- C. The engine generator unit will be installed in Taunton, MA and rated for use at this location's elevation level. Outdoor enclosed units shall be provided with heating and cooling as required to maintain the generator set operational within the temperature limits of all devices and equipment. The engine generator unit shall be suitable for continuous operation at any temperature between 0 and 110 degree F at its full load rating and at 80 percent power factor.
- D. The engine generator unit shall be designed and built in accordance with the latest standards of IEEE, NEMA, ANSI and ASME.
- E. The engine generator unit shall be designed to minimize the danger of accidents to operating and maintenance personnel. The manufacturer shall, prior to shipment, verify that all electrical connections are tight and that circuits are isolated, that on-set piping connections are well-made, and that standard safety equipment is included and functions according to design.

1.06 ENGINE GENERATOR UNIT PERFORMANCE

- A. The engine generator unit shall maintain rated frequency from no load to full rated load.
- B. The voltage regulation shall be as specified herein and recovery to steady state operation shall be within two seconds.

- C. Stable or steady state operation is defined as operation with terminal voltage remaining constant within plus or minus one percent of rated voltage. A rheostat shall provide a minimum of plus or minus five percent voltage adjustment from rated voltage.
- D. Frequency regulation shall be maintained within 2½ percent of rated frequency from no load to full load. The steady state frequency shall be within 0.5 percent of rated frequency.
- E. The engine shall be equipped with a electronic isochronous governor capable of maintaining the engine speed from no load to full load within plus or minus .25 percent of the synchronous speed.

1.07 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.
- B. Protect material and equipment, in accordance with the manufacturers recommended storage procedures, before, during, and after installation. Stored items shall be protected from the weather and contamination. During installation, piping and similar openings shall be capped to keep out dirt and other foreign matter.

1.08 WARRANTY/SERVICE

- A. The manufacturer's and dealers Extended Service Coverage shall in no event be for a period of less than five (5) years from date of Owner/Engineer's acceptance of the system and shall include repair parts, labor, travel expense necessary for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of maintenance and repair. Applicable deductible costs applying only after the first year shall be specified in the manufacturer's warranty and not exceed \$500 per site visit. Submittals received without written warranties as specified will be rejected in their entirety. Warranty and maintenance shall be issued and executed by the dealer and may not be subcontracted.
- B. The generator set supplier shall have factory trained service representatives and tooling necessary to install, test maintain, and repair all provided equipment and shall be located within 150 miles of the customer's site.

PART 2 – PRODUCTS

2.01 ENGINE

- A. The engine shall be natural gas fueled, four (4) cycle, water-cooled, while operating with nominal speed not exceeding 1800 RPM. The engine shall meet applicable EPA non-road mobile regulations and/or the EPA NSPS rule for stationary reciprocating compression ignition engines. Additionally, the engine shall comply with the State and Federal emission regulations at the time of installation/commissioning. Actual engine emissions values must be in compliance with applicable EPA emissions standards per ISO 8178 Emissions Cycle at specified ekW/bHP rating.

- B. The engine shall be furnished with thermostatically controlled jacket water heaters of the size recommended by the supplier. Heaters shall be rated at 600 Watts for operation on 120 Volts.
- C. The oil sump will be fitted with pipe nipples, a ball valve, and an extension oil drain.
- D. The engine shall be provided with a governor which maintains the frequency within a bandwidth of the rated frequency, over a steady-state load range of zero to 100% of rated output capacity. The governor shall be configured for safe manual adjustment of the speed/frequency during operation of the engine-generator set, without special tools, from 90 to 110% of the rated speed/frequency, over a steady state load range of 0 to 110% or rated capacity.
 - 1. Steady state speed band, +/- 0.25% of rated speed.
 - 2. Internal oil pump, relief valve and accumulator controls governor operating pressure.
 - 3. Manual speed adjustment knob at top of unit.
 - 4. Positive locking to allow manual speed adjustment.

2.02 COOLING SYSTEM

- A. The engine shall be furnished with a unit mounted radiator. The radiator shall be of sufficient size to cool the water when ambient temperature is 100 degrees F. and the engine generator unit is operating at full rated load continuously.
- B. Cooling system shall further include water cooled manifolds, pusher fans and high temperature cutout. Provide radiator duct connector complete with suitable gasket, bolts and nuts. The cooling system shall be furnished with sufficient antifreeze solution to protect the cooling system with ambient air temperature down to minus fifty degrees F.
- C. Provide an anti-freeze treatment as recommended by the manufacturer for protection against corrosion and scale formation. The anti-freeze treatment shall be compatible with the antifreeze solution. The anti-freeze will be long life environmentally friendly polypropylene glycol. The concentration will be as recommended by the manufacturer.

2.03 FUEL SYSTEM

- A. The engine shall be equipped with a complete base mounted natural gas fuel system rated for 5 to 11 inch H₂O incoming gas pressure including
 - 1. Fuel line solenoid valve.
 - 2. Flexible fuel connectors.
 - 3. Fuel injection system.

4. Dry fuel filters
5. Manual shutoff valve
6. Pressure Gauge
7. Fuel regulator and any other components normally supplied or recommended by the manufacturer for this application.

2.04 EXHAUST SILENCER

- A. The engine generator unit shall be provided with a critical type silencer including flexible exhaust fittings. Silencers shall be mounted so that its weight is not supported by the engine. Exhaust piping shall be sized as recommended by the manufacturer. Connection between engine and silencer shall be of the stainless steel flexible type.
- B. A flexible section shall be provided at each engine and an expansion joint at each muffler. Flexible sections and expansion joints shall have flanged connections. Flexible sections shall be made of convoluted seamless tube without joints or packing. Expansion joints shall be the bellows type. Expansion and flexible elements shall be stainless steel suitable for natural-engine exhaust gas at the maximum exhaust temperature that is specified by the engine manufacturer. Expansion and flexible elements shall be capable of absorbing vibration from the engine and compensation for thermal expansion and contraction.
- C. Horizontal sections of exhaust piping shall be sloped downward away from the engine to a drip leg for collection of condensate with drain valve and cap. Changes in direction shall be long radius. Exhaust piping, mufflers and silencers installed shall be insulated with 3 inches of calcium silicate insulation and covered with aluminum flashing to protect personnel.
- D. All portions of the exhaust system shall be insulated and covered with flashing.

2.05 STARTING SYSTEM

- A. The electric starting system shall consist of the following equipment:
 1. The engine shall have a two wire, direct current starter suitable for automatic starting through the load transfer switch.
 2. Batteries shall be of the lead-acid type. Batteries shall be guaranteed to have sufficient capacity when in a fully charged state to perform not less than five, 15 second cranks while in an ambient temperature of 0 degrees F without recharging.
 3. Current limiting type automatic battery charger conforming to UL 1236 shall be of the static type, magnetic amplifier control with led status lights, battery temperature compensation, and user adjustable parameters factory set to match

battery charge curve. Charger to be completely automatic, charging rate to be determined by the state of the battery, and reducing to milliamp current on a fully charged battery. Charger shall be for 120 Volt, single phase, 60 Hertz A.C. input with an output of not less than 10 amperes. The charger shall be for the correct voltage for the battery, and specifically for charging a lead-acid battery and for panel mounting.

2.06 ALTERNATOR

- A. The alternator shall be single bearing, open, drip-proof revolving field, four pole brushless type, permanently aligned to the engine by flexible disc coupling. Each unit shall be reconnectable type having nine leads and shall be factory connected for single phase, 3 wire, 60 Hertz. The rating of the unit shall be as indicated on the drawings.
- B. Alternators shall have Class F insulation and shall be furnished with Amortisseur windings. Alternators shall have a complete static automatic voltage regulator which will hold the voltage within plus or minus two percent from no load to full rated load. On application of rated load in one step, the transient voltage dip shall not exceed twenty percent. The generator windings shall be braced to withstand any possible short circuit stresses. Alternator shall be "Radio Interference Proof" (RIP) and "Telephone Influence Factor" (TIF) and shall be within the limits of Section 9, ANSI C50.12. Alternators shall have a rotating brushless exciter and rectifier.
- C. The alternator characteristics shall be matched to the torque characteristics of the engine in such a manner that with full load connected to the alternator terminals, the alternator will utilize all the available engine power without exceeding it at all speeds.
- D. The generator exciter shall be of the brushless type. Semiconductor rectifiers shall have a minimum safety factor of 300% for peak inverse voltage and forward current ratings for all operating conditions, including 110% generator output at 40 degrees C 104 degrees F ambient. The exciter and regulator in combination shall maintain generator-output voltage within the limits specified.
- E. Each generator shall be provided with a solid-state voltage regulator, separate from the exciter. The regulator shall maintain the voltage within a bandwidth of the rated voltage, over a steady-state load range of zero to 100% of rated output capacity. Regulator shall be configured for safe manual adjustment of the engine-generator voltage output without special tools, during operation, from 90 to 110% of the rated voltage over the steady state load range of 0 to 100% of rated output capacity. Regulation drift shall not exceed plus or minus 0.5% for an ambient temperature change of 20 degrees C. 68 degrees F.
- F. Alternators shall be furnished with 120V stator heater and controls.

2.07 CONTROLS

- A. The engine generator units shall be furnished with a shock resistant, engine mounted NFPA 110 compliant microprocessor based controller.
- B. Standard data available shall include:
 - 1. Jacket water temperature
 - 2. Lube oil temperature
 - 3. Lube oil pressure
 - 4. Battery voltage
 - 5. RPM
 - 6. A.C. Voltmeter
 - 7. A.C. Ammeter
 - 8. Frequency meter
 - 9. Elapsed time meter calibrated in hours and tenths of hours
- C. Accessories shall include:
 - 1. Current transformers.
 - 2. Fuses
 - 3. Generator voltage regulator
 - 4. Voltage adjusting rheostat.
 - 5. Fault indication lights one each for:
 - a. low oil pressure
 - b. high water temperature
 - c. overspeed
 - d. overcrank (fail to start).
 - 6. Prewarn indication lights one each for:
 - a. low oil pressure
 - b. high water temperature.
 - 7. 90 DB (a) Audible alarm to sound on any fault or prewarn and an alarm silencer.

8. Mode selector switch – "AUTO", "OFF", "MANUAL" with audible alarm when switch is not in "AUTO" position.
 9. Control power fuse.
 10. Fixed overcrank timer - four-10 second cranks shall be provided. After four cranks, the unit shall stop and an alarm initiated.
 11. Auxiliary contacts which close when engine is in operation. Contacts shall be rated 10 amperes and shall be used to interlock combustion and ventilation air dampers.
 12. Common failure relay
 13. Dry contact kit with the minimum following contact signals:
 - a. Engine Running
 - b. Engine Trouble
 - c. Battery Charger Alarm
 14. Engine sensors for low water temperature near low oil pressure, near high water temperature.
- D. In addition to the equipment included in the control panel described above, the unit shall include a power and control junction box mounted on the generator. This junction box shall include:
1. Power conductors terminated with pressure type ring connectors.
 2. Neutral connection.
 3. Terminal block with marked connection points for all external control connections and for jacket heaters, etc.
 4. Molded case line circuit breaker with interrupting rating of 100 KA amperes RMS, electronic LSI, and ground fault relay alarm.
- E. Automatic shutdown shall be provided for each of the following conditions:
1. High jacket water temperature
 2. Low jacket water pressure
 3. Low lubricating oil pressure
 4. Engine overspeed
 5. Unit fail to start.

- F. Auxiliary normal open dry contacts shall be provided for remote transmission of unit failure.
- G. Provide a factory wired weather proof remote emergency stop pushbutton operator station mounted on the generator enclosure.

2.08 SUB-BASE

- A. The engine, generator and radiator shall be mounted on a structural steel base designed to maintain proper alignment. Vibration isolators shall be furnished of the size and type recommended by the supplier.

2.09 ENCLOSURE

- A. A sound-attenuated weather-protective housing shall be furnished. The housing shall enclose the complete unit and all related equipment (e.g. battery, battery charger, engine controls and control panel, etc). All components shall be wired and piped within the enclosure.
- B. The housing shall be constructed of 2mm formed aluminum and shall include hinged locking access doors. Housing surfaces shall be prime painted with two coats of a rust resistant primer and finished with a dark green enamel paint.
- C. The housing shall be sound insulated, vandal proof, and padlocked. The resulting structure with engine-generator in operation shall not transmit more than 57 db at a distance of 23 feet from the generator in any direction. There shall be no Puretone. The generator set manufacturer shall choose the thickness of insulation to meet the aforementioned sound criteria.
- D. The housing shall be furnished with weather-protective fixed louvers, and weather-protective flanged door openings to insure weather-resistant construction.
- E. Stainless steel flexible exhaust sections shall be provided. Exhaust outlet shall be terminated with a “shanty cap” designed so to prevent entrance of rain into exhaust outlet. All handles, sheet metal screws, bolts, nuts, hinges, and other exterior hardware shall be stainless steel.
- F. Provide factory wired instruction detection style doors switches for each of the enclosure entry doors that shall be wired in series to one another and terminated at a junction box within the generator enclosure.

PART 3 – EXECUTION

3.01 MANUFACTURER'S SERVICES

- A. A minimum of one, eight-hour day shall be provided to supervise the installation and testing of the equipment furnished, to assist in start-up and train Owners maintenance personnel.

- B. A minimum of one, four hour day, not including travel time to and from the site, shall be used by a fully qualified field service engineer to make necessary adjustments and to provide operator training on the equipment furnished. This work shall occur after the equipment has been in operation and at the request of the owner, but not to exceed one year after the acceptance of the facility.

3.02 TESTS

- A. At least 48 hours prior to the load test, the manufacturer shall perform a pretest. The pretest shall be conducted in the presence of the Engineer. The pretest shall determine that the unit is ready for load testing and that all components are functioning correctly. All adjustment for tuning the unit shall be made during the pretest. If remedial work is required, the work shall be performed before the load test is conducted.
- B. Upon completion of the installation, the manufacturer of the equipment shall test the complete unit, at full load, using load banks, for four continuous hours. During the test, the following data shall be taken at 15 minute intervals:
 - 1. Outside air temperature
 - 2. Generator room temperature
 - 3. Oil pressure
 - 4. Oil temperature
 - 5. Jacket water temperature
 - 6. Battery charge rate
 - 7. Fuel pressure
 - 8. A.C. Volts
 - 9. A.C. Amps
 - 10. Frequency
 - 11. Kilowatts.
- C. Following the test, three successive simulated power outages shall be conducted using all connected building load.
- D. The equipment shall be left in good operating order and the settings of all alarm and shutdown devices verified.

3.03 OPERATION AND MAINTENANCE MANUALS

- A. Furnish Operation and Maintenance Manuals as specified in Section 01730.
- B. Maintenance instructions shall be furnished for batteries, to include simple and clear procedures for addition of liquids, maintaining cleanliness, proper ventilation, proper electrical connections.
- C. Maintenance instruction shall be furnished for engines, including recommended lubricants, coolants, etc., recommended maintenance intervals, and recommended ventilation requirements.

- D. The Operating manual shall be a simple starting and stopping procedure, with reference to shop drawings information for more complicated procedures.

- END OF SECTION -