

TOWN OF WILMINGTON, MASSACHUSETTS

**CONTRACT AND SPECIFICATIONS
FOR
SALEM STREET WELLFIELD REPLACEMENT**

JUNE 2021



1 BEACON STREET, SUITE 8100 BOSTON, MA 02108

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SECTION 00020

INVITATION TO BID
SALEM STREET WELLFIELD REPLACEMENT PROJECT

The Town of Wilmington acting through its Division of Water and Sewer is seeking bids for the **Salem Street Wellfield Replacement Project**.

Sealed General Bids for **Salem Street Wellfield Replacement Project** will be received by the Office of the Town Manager at the Wilmington Town Hall, 121 Glen Road, Wilmington, MA 01887, until **10:00 am on August 3, 2021** at which time and place said bids will be publicly opened and read aloud. The bids shall be submitted in a sealed envelope, clearly marked to indicate the contents.

Sealed Bids for Division 16 – Electrical Work will be received by the Office of the Town Manager at the Wilmington Town Hall, 121 Glen Road, Wilmington, MA 01887, until **10:00 am on July 22, 2021** at which time and place said bids will be publicly opened and read aloud. The bids shall be submitted in a sealed envelope, clearly marked to indicate the contents.

The work includes construction of three (3) new 18” by 24” diameter gravel pack wells, abandonment of existing wells, water main installation, water main cleaning, pump station electrical upgrades and heating and ventilation upgrades. Work within the Salem Street Pump Station is subject to special schedule requirements – refer to Section 01010.

A non-mandatory pre-bid walkthrough will be held on **July 14, 2021 at 9:00 am** starting at the Project Site. All interested Contractors are urged to attend.

Contract Final Completion time shall be 120 calendar days commencing from the date of Notice to Proceed. Liquidated damages for each calendar day of delay shall be One Thousand Dollars and Zero Cents (\$1,000.00) as stipulated in the Contract documents.

Each general bid must be accompanied by a copy of a Certificate of Eligibility (DCAM CQ-1) issued by the Deputy Commissioner of the Massachusetts Division of Capital Asset Management showing that the bidder has the classification and capacity rating to perform work in the Pumping Stations category.

Each filed sub-bid must be accompanied by a copy of a Certificate of Eligibility (DCAM CQ-1) issued by the Deputy Commissioner of the Massachusetts Division of Capital Asset Management showing that the bidder has the classification and capacity rating to perform work in the Electrical category.

Each general bid and filed sub-bid must also be accompanied by an update statement (Appendices C and D, Update Statement, DCAM CQ-3) in the form prescribed by the Deputy Commissioner. A blank copy of the update statement is included in the Contract Documents and will be available on request at the office where documents are obtained. Any general bid or filed sub-bid submitted without the appropriate certificate and update statement shall be invalid.

Each General bid and Sub-bid shall be accompanied by a bid security in the form of a certified, treasurer's or cashier's check, bid bond or cash in the amount of 5 percent of the value of the Bid or sub-bid, as applicable. Every bid bond, every performance bond and every payment bond issued for any construction work in the commonwealth shall be the bond of a surety company organized pursuant to section 105 of chapter 175 or of a surety company authorized to do business in the Commonwealth under the provisions of section 106 of said chapter 175 and be approved by the U.S. Department of Treasury and are acceptable as sureties and reinsurers on federal bonds under Title 31 of the United States Code, sections 9304 to 9308.

Contract Documents may be examined and obtained at the Office of the Town Manager at the Wilmington Town Hall, 121 Glen Road, Wilmington, MA 01887. Contract Documents will be provided in digital format only through the Town's Purchasing Department website with completion of a bidder request form, or upon request.

The successful General Bidder must furnish 100 percent Construction Performance Bond and 100 percent Payment Bond with a surety company acceptable to the Owner.

The Owner reserves the right to waive any informalities or to reject any or all bids. A bid which includes, for any item, a unit cost that is abnormally low or high may be rejected as unbalanced. The right is also reserved to accept any bid deemed to be best for the interest of the Town of Wilmington.

Minimum wage rates as determined by the Department of Workforce Development under the provisions of M.G.L., Chapter 149, Section 26 to 27D, inclusive apply to this project. It is the responsibility of the Contractor, before bid opening to request if necessary, any additional information on Prevailing Wage Rates for those trades people who may be employed for the proposed work under this contract.

To be considered a responsive Bidder, the Contractor shall have obtained at least one set of Bidding Documents from the Owner or Engineer. The Bid will not be awarded unless a record of obtaining at least one set of Bidding Documents exists. No Bidder may withdraw his/her Bid for a period of thirty days, excluding Saturdays, Sundays, and legal holidays, after the actual date of the opening of the Bids. Complete instructions for filing Bids and Sub-Bids are included in the Instruction to Bidders.

Materials and supplies used or incorporated in the performance of this contract are exempt from sales and use tax.

The bidding and award of the Contract shall be in full compliance with Sections 44A to 44J inclusive of Chapter 149 of the General Laws of the Commonwealth of Massachusetts as last revised.

END OF SECTION

SECTION 00100

INSTRUCTIONS TO BIDDERS

- Article 1. Receipt and Opening of Bids
- Article 2. Bidders Eligibility
- Article 3. Not Used
- Article 4. Information not Guaranteed
- Article 5. Subsurface Investigations
- Article 6. Easements
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- Article 8. Bidders to Investigate
- Article 9. Questions Regarding Drawings and Documents
- Article 10. Blank Form for Bid
- Article 11. Items
- Article 12. Bid Security
- Article 13. Withdrawal of Bids
- Article 14. Right to Reject Bids
- Article 15. Comparison of Bids
- Article 16. Reduction in Scope of Work
- Article 17. Contract Bonds
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- Article 19. Insurance Certificates
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- Article 22. Applicable Provisions of State Laws and Federal Regulations
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- Article 25. Safety and Health Regulations
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- Article 27. Change Orders
- Article 28. Commonwealth of Massachusetts - Supplemental Program
- Article 29. Affirmative Action Workforce Reporting System Procedures -
NOT REQUIRED FOR THIS PROJECT
- Article 30. Utility Underground Plant Damage Prevention System
- Article 31. Competitive Bidding
- Article 32. Contractor's Guarantee
- Article 33. Not used
- Article 34. Third Party Work

ARTICLE 1. RECEIPT AND OPENING OF BIDS

- 1.1 Sealed bids for the work of this Contract will be received at the time and place indicated in the Invitation to Bid.
- 1.2 OWNER may consider informal any Bid not prepared and submitted in accordance with the provisions hereof.
- 1.3 Bidders are cautioned that it is the responsibility of each individual bidder to assure that his bid is in the possession of the responsible official or his designated alternate prior to the stated time and at the place of the Bid Opening. Owner is not responsible for bids delayed by mail and/or delivery services, of any nature.
- 1.4 Forthwith after the time limits for the filing of general bids and subbids, such bids shall be publicly opened and read aloud.
- 1.5 The bidding procedure shall be in accordance with the provisions of Sections 44A to 44I, inclusive, of Chapter 149 of the General Laws of Massachusetts as amended to date. Copies of Sections 44A to 44I, inclusive, of Chapter 149 may be obtained from the office of the Secretary of State, State House, Boston, Massachusetts 02133.
- 1.6 If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope and addressed as indicated in the Invitation to Bid.

ARTICLE 2. BIDDERS ELIGIBILITY

- 2.1 Each general bid and filed sub-bid shall be accompanied by a copy of a Certificate of Eligibility (DCAM) issued by the Deputy Commissioner of the Division of Capital Planning and Operation showing that the bidder has the classification and capacity rating to perform Electrical or Pump Station work. Each general bid shall also be accompanied by an update statement (Update Statement, DCAM CQ-3) and each filed sub-bid shall also be accompanied by an update statement (Update Statement, DCAM CQ-3) in the form prescribed by the Deputy Commissioner. A blank copy of each of the update forms is included in the Contract Documents, Appendices C and D.
- 2.2 Any general bid or filed sub-bid submitted without the appropriate Certificate of Eligibility and update statement shall be invalid.
- 2.3 The Owner may make such other investigation as it deems necessary, and the Bidder shall furnish to the Owner, under oaths if so required, all such information and data for the purpose of qualification, ability, and experience of the Bidder.

ARTICLE 3. NOT USED

ARTICLE 4. INFORMATION NOT GUARANTEED

- 4.1 All information given on the Drawings or in the other Contract Documents relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of bidders and is not guaranteed.
- 4.2 It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes, or other structures encountered during construction will be the same as those indicated on the Drawings or in the other Contract Documents.
- 4.3 It is agreed further and understood that no bidder or contractor shall use or be entitled to use any of the information made available to him or obtained in any examination made by him in any manner as a basis of or ground for any claim or demand against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other conditions, natural phenomena, existing pipes or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

ARTICLE 5. SUBSURFACE INVESTIGATIONS

- 5.1 Subsurface investigations have been made in the form of drilled wells in the approximate locations indicated on the drawings. Investigation logs of the test and observations wells are in Appendix C.

ARTICLE 6. EASEMENTS

- 6.1 As indicated on the drawings, the work will be located on property owned by the Owner.
- 6.2 On all other lands, the Contractor has no rights unless he obtains them from the proper parties.
- 6.3 The Contractor shall not work on property requiring obtaining of an easement until the Owner has obtained the necessary easement.
- 6.4 The Contractor shall have no claim for additional compensation or damage on account of any delay in obtaining the necessary easements.

ARTICLE 7. NOT USED

ARTICLE 8. BIDDERS TO INVESTIGATE

- 8.1 Bidders are required to submit their Bids upon the following express conditions which shall apply to and be deemed a part of every Bid received.

- 8.2 Bidders must satisfy themselves by personal examination of the site of the Work and by such other means as they may wish, as to the actual conditions there existing, the character and requirements of the Work, the difficulties attendant upon its execution, and the accuracy of all estimated quantities stated in the Bid.

ARTICLE 9. QUESTIONS REGARDING DRAWINGS AND DOCUMENTS

- 9.1 In general, no answer will be given to prospective bidders in reply to an oral question if the question involves an interpretation of the intent or meaning of the Drawings or other Contract Documents, or the equality or use of products or methods other than those designated or described on the Drawings or in the Specifications. Any information given to bidders other than by means of the Drawings and other Contract Documents, including Addenda, as described below, is given informally, for information and the convenience of the bidder only and is not guaranteed. The bidder agrees that such information shall not be used as the basis of nor shall the giving of any such information entitle the bidder to assert any claim or demand against the Owner or the Engineer on account thereof.
- 9.2 To receive consideration, such questions shall be submitted in writing to the Owner (Office of the Town Manager at the Wilmington Town Hall, 121 Glen Road, Wilmington, MA 01887, (978) 694-2047), at least seven (7) working days before the established date for receipt of Bids. In general, the Engineer will neither approve nor disapprove particular products prior to the opening of Bids; such products will be considered when offered by the Contractor for incorporation into the Work in accordance with the requirements of Section 01300 - SUBMITTAL PROCEDURES.
- 9.3 The Engineer will set forth as Addenda, which shall become a part of the Contract Documents, such questions received as above provided as in his sole judgment are appropriate or necessary and his decision regarding each. At least five days prior to the receipt of Bids, he will send a copy of these Addenda to those prospective bidders and parties known to have taken out sets of the Drawings and Contract Documents.
- 9.4 The Contractor agrees to use and base his/her bid on the products and methods designated or described in the Specifications as amended by the Addenda.

ARTICLE 10. BLANK FORM FOR BID

- 10.1 All Bids must be upon the blank form for Bid annexed hereto Section 00301 – Bid Form for General Bid and Section 00302 – Bid form Sub-Bid Part II – Electrical Work, state the proposed price for each item of the Work, both in words and in figures, and be signed by the bidder with his business address and place of residence.

ARTICLE 11. ITEMS

- 11.1 The major part of the work to be done under the contract shall be done under Item 1 (work done by the General Contractor), The total price bid for Item 1 shall

include compensation for furnishing all materials and doing all work indicated on the drawings and specified herein, except that work included for compensation under Item 2.

- 11.2 Certain other work to be done under this contract shall be done under Item 2, for which a lump-sum price shall be bid by the respective subbidder.
- 11.3 The total of the prices bid for Items 1 and 2 shall be the proposed contract price which shall be stated by the General Bidder in Section 00301 - BID.

ARTICLE 12. BID SECURITY

- 12.1 Each Bid submitted by general bidders and by subbidders filing bids in accordance with the required procedure must be accompanied by a bid deposit in the form of cash, or a certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company and payable to the order of Town of Wilmington or by a bid bond prepared on the form of BID BOND (see Section 00410) attached hereto duly executed and acknowledged by the bidder, as Principal, and by a surety company qualified to do business in the Commonwealth of Massachusetts and satisfactory to the Owner, as Surety.
- 12.2 The amount of bid deposits for General and Filed Subbids shall be as designated in the INVITATION TO BID.
- 12.3 The bid deposit must be enclosed in the sealed envelope containing the BID.
- 12.4 Every bid bond, every performance bond and every payment bond issued for any construction work in the commonwealth shall be the bond of a surety company organized pursuant to Section 105 of Chapter 175 or of a surety company authorized to do business in Commonwealth under the provisions of Section 106 of said Chapter 175 and be approved by the U. S. Department of Treasury and acceptable as sureties and reinsurers on federal bonds under Title 31 of the United States Code, sections 9304 to 9308.
- 12.5 Each bid deposit may be held by the Owner as security for the fulfillment of the bidder's promises, set forth in his BID that (a), if a general bidder, he will not withdraw his BID while it is being considered and will execute the AGREEMENT and furnish the required CONTRACT BONDS and insurance certificates (Bidders should note the requirements set forth in the AGREEMENT relative to furnishing proof of carriage of Workmen's Compensation Insurance) if his BID is accepted or, (b), if a subbidder, he will become bound to the General Contractor as stipulated if he is selected as subcontractor for the work on which he bid.
- 12.6 The return of bid deposits will be in the manner prescribed by Section 44B of Chapter 149 of the General Laws of Massachusetts.

- 12.7 The three lowest responsible and eligible general bidders, every subbidder named in the general bid of such general bidders, and the three lowest responsible and eligible subbidders for every subtrade whose bid deposit is not returned pursuant to the provisions of the preceding paragraph may each as of right file with the awarding authority, at any time after five days, Saturdays, Sundays, and legal holidays excluded, from the opening of the general bids, a bond in an amount not less than the amount of his bid deposit, in a form satisfactory to the awarding authority, and satisfactory to the awarding authority as surety, and conditioned upon the faithful performance by the principal of his agreements as contained in his bid. Upon the filing of a bond as aforesaid, the bid deposit of the general bidder or subbidder filing such bond will forthwith be returned to him.

ARTICLE 13. WITHDRAWAL OF BIDS

- 13.1 Except as hereinafter in this subsection or otherwise expressly provided, once his bid is submitted and received by the Owner for consideration and comparison with other bids similarly submitted, the Bidder agrees that he may not and will not withdraw it within the period prescribed in Section 44A, Chapter 149 of the General Laws of Massachusetts, as amended to date.
- 13.2 Upon proper written request and identification, bids may be withdrawn only as follows:
- A. At any time prior to the designated time for the opening of bids.
 - B. Provided the Bid has not theretofore been accepted by the Owner, at any time subsequent to the expiration of the period during which the bidder has agreed not to withdraw his Bid.
- 13.3 Unless a Bid is withdrawn as provided above, the bidder agrees that it shall be deemed open for acceptance until the AGREEMENT has been executed by both parties thereto or until the Owner notifies a bidder in writing that his Bid is rejected or that the Owner does not intend to accept it, or returns his Bid deposit. Notice of acceptance of a Bid shall not constitute rejection of any other Bid.

ARTICLE 14. RIGHT TO REJECT BIDS

- 14.1 The Owner (awarding authority) reserves the right to reject any or all General Bids should the Owner deem it to be in the public interest to do so. The Owner reserves the right to reject any subbid on any subtrade, if it is determined that such subbid does not represent the subbid of a person competent to perform the Work specified, or that less than three such subbids were received and the prices are not reasonable for acceptance without further competition.
- 14.2 The Owner must, by law, reject every bid which is not accompanied by the required bid deposit or which does not otherwise conform to Sections 44A to 44H, inclusive, of Chapter 149 of the General Laws of Massachusetts, or which is on a form not completely filled in, which is incomplete, conditional, obscure, or which contains any addition not called for.

- 14.3 The Owner may reject Bids which in its' sole judgment are incomplete, conditional, obscure or not responsive or which contain additions or deletions not called for, erasures not properly initialed, alterations or similar irregularities. The Owner may waive such omissions, conditions or irregularities.

ARTICLE 15. COMPARISON OF BIDS

- 15.1 The Owner agrees to examine and consider each BID submitted in consideration of the Bidder's agreements, as hereinabove set forth and as set forth in the BID.
- 15.2 In case of discrepancy between prices bid in writing and in figures; the writing shall govern. In case of discrepancy between the product obtained by multiplying the estimated quantity by the unit price, and the extended amount, the product obtained shall govern. In case of discrepancy between total of extended amounts and total amount of bid stated, total of items shall govern.
- 15.3 The several Bids will be compared on the basis of the prices bid, and the contract will be awarded to the lowest responsible and eligible bidder, as defined in Section 44A, Chapter 149, General Laws of Massachusetts.

ARTICLE 16. REDUCTION IN SCOPE OF WORK

- 16.1 The Owner reserves the right to decrease the scope of the work to be done under this Contract and to omit any work in order to bring the cost within available funds. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any items 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.

ARTICLE 17. CONTRACT BONDS

- 17.1 The Bidder whose Bid is accepted agrees to furnish the Contract Bonds in the forms which follow in SECTION 00610-PERFORMANCE BOND and SECTION 00620-PAYMENT BOND, each in the sum of the full amount of the Contract and duly executed by the said bidder as Principal and by a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Owner, as Surety, for the faithful performance of the Contract and payment for labor and materials. The premiums for such Bonds shall be paid by the Contractor.
- 17.2 Every bid bond, every performance bond and every payment bond issued for any construction work in the commonwealth shall be the bond of a surety company organized pursuant to Section 105 of Chapter 175 or of a surety company authorized to do business in Commonwealth under the provisions of Section 106 of said Chapter 175 and be approved by the U. S. Department of Treasury and

acceptable as sureties and reinsurers on federal bonds under Title 31 of the United States Code, sections 9304 to 9308.

ARTICLE 18. EXECUTION OF AGREEMENT

- 18.1 The Bidder to whom the Contract is awarded shall comply with the provision of Chapter 30, Section 39R of the General Laws of Massachusetts as amended to date; and as provided therein shall, prior to execution of the contract, file a statement of management on internal accounting controls and an audited financial statement for the most recent completed fiscal year. See SECTION 01069-Massachusetts General Laws.
- 18.2 The Bidder to whom the contract is awarded will be required and agrees to duly execute the AGREEMENT and furnish the required CONTRACT BONDS within the time limit stated in the BID after notification that the AGREEMENT is ready for signature.

ARTICLE 19. INSURANCE CERTIFICATES

- 19.1 The Contractor will not be permitted to start any construction work until he has submitted certificates covering all insurances called for under Supplementary Condition 2.05 of Section 00800A.

ARTICLE 20. MASSACHUSETTS SALES AND USE TAX

- 20.1 Materials and equipment purchased for permanent installation in this project will be exempt from the Massachusetts Sales and Use Tax. The exemption certificate number will be furnished to the Contractor. Each bidder shall take this exemption into account in calculating his bid for the work.

ARTICLE 21. MASSACHUSETTS WAGE RATES

- 21.1 Massachusetts Wage Rates as established pursuant to the provisions of M.G.L. Chapter 149, Section 26-27D apply to this project. The Massachusetts Wage Determination is attached to these specifications. It is the responsibility of the Contractor, before bid opening, to request, if necessary, any additional information on Massachusetts Wage Rates for those tradespeople who are not covered by the applicable Massachusetts Wage Decision, but who may be employed for the proposed work under this contract.
- 21..2 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 on Minimum Wage Rates for those trades people who may be employed for the proposed work under this contract.

ARTICLE 22. APPLICABLE PROVISIONS OF STATE LAWS AND FEDERAL REGULATIONS

- 22.1 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.

ARTICLE 24. ACCESS TO WORK

- 24.1 Representative of the Commonwealth and any local agencies having a direct interest in the Work shall have access to the Work under this contract wherever it is in preparation or progress and which required the Contractor to provide proper facilities for such access and inspection.

ARTICLE 25. SAFETY AND HEALTH REGULATIONS

- 25.1 This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to all subsequent amendments 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.
- 25.2 *Chapter 306 of the Acts of 2004, An Act Relative to the Health and Safety on Public Construction Projects*, amends Section 39M of Chapter 30 of the Massachusetts General Laws. In summary fashion, the Act states that the lowest responsible and eligible bidder (who is awarded the c.30 or c.149 contract) shall certify that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

ARTICLE 26. MANUFACTURER'S EXPERIENCE

- 26.1 Wherever 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 executed on a form to be approved by the Owner.

ARTICLE 27. CHANGE ORDERS

27.1 Change orders will be processed in accordance with the General and Supplemental General Conditions.

ARTICLE 28. NOT USED

ARTICLE 29. NOT USED.

ARTICLE 30. UTILITY UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM

30.1 All excavations within public or private ways are subject to the requirements of Massachusetts General Law, Chapter 82, Section 40.

ARTICLE 31. COMPETITIVE BIDDING

31.1 The bidding and award of the Contract and Subcontracts shall be in full compliance with Chapter 149, Sections 44A to 44J inclusive of the General Laws of the Commonwealth of Massachusetts as last revised. Bids from General Contractors shall be for the complete project as specified and shall include the names of all Subcontractors designated in the Bid Form, and the General Contractor shall be selected on the basis of such Bid. Each General Bid shall be divided into two parts.

- a. Part I-The work of the General Contractor being all work other than that covered by Part II and Part III.
- b. Part II-The work of all Subcontractors and the Bid prices therefor as listed in the Form for General Bid attached hereto.

31.2 As required by law, Filed Sub-Bids for each of the following classes of work will be received at the time and place stated in the Invitation to Bid:

ARTICLE 32. – CONTRACTOR’S GUARANTEE

32.1 The Contractor guarantees the work under this contract and the materials furnished by him for use in connection therewith to be free from defects or flaws for one (1) year after the completion of the contract, and guarantees for a term of one (1) year from the date of substantial completion of the work to maintain the stability of all materials, equipment or workmanship, except that due to normal wear and tear, at his/her own expense when notified in writing to do so by the Engineer and such work shall be performed to the satisfaction of the Engineer. If at any time within said guarantee period, any part of the work constructed under the terms of this contract shall in the opinion of the Engineer require repair or replacement due to defective work or materials furnished by the Contractor and any related work required to make said repair or replacement, he/she may notify the Contractor in writing to make the required work and repairs (including all labor and materials) at no additional costs to the Owner. The Contractor shall perform the same within 10 days. If he/she shall not do so, the Owner may have the work performed by others and charge the Contractor.

- 32.2 It is expressly understood, however, that these guarantee provisions shall not absolve the Contractor from any liability to the Owner arising out of a failure to substantially complete the work in accordance with the plans and specifications.
- 32.3 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.

ARTICLE 33. NOT USED

ARTICLE 34. THIRD PARTY WORK

- 34.1 The Contractor is responsible for maintaining a safe and secure worksite at all times, and for expeditiously repairing any damage done to private property. If, in the opinion of the Owner, the Contractor is negligent in these duties the Owner shall have the right to employ a third party to remedy the problem.
- 34.2 Situations which develop and require the services of and payment to a third party will be handled in the following manner:
- A. The Contractor will be given a reasonable period of time determined at the discretion of the Owner to remedy the situation without third party involvement. If the Contractor is unavailable, the Owner will authorize work by a third party on the Contractor's behalf.
 - B. Third party work authorized on the Contractor's behalf by the Owner shall be paid for by the Contractor within a reasonable time period (generally two weeks). If payment is not made within a reasonable time period, the Owner will make payment and deduct the cost from the next payment requisition.
 - C. In the case of inadequately secured worksites necessitating extra or increased police details or other public safety personnel, the following procedure will be followed. The Contractor (if available) will be notified that the worksite needs to be secured in order to prevent the need for weekend/night police coverage. If the area is not immediately secured as determined by the Owner or Engineer, a police, fire, or highway department detail will be used and the Contractor will be charged for the cost. It is understood that in many instances worksites cannot realistically be secured to a point where police or other public safety personnel are not needed. In these instances, the Owner will continue to pay for that coverage.

END OF SECTION

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SECTION 00301

BID

FORM FOR GENERAL BID

To the Town of Wilmington, herein called the Owner, acting by and through its Town Manager, for Salem Street Wellfield Replacement Project.

A. The undersigned proposes to furnish all labor and materials required for the Barrows Wellfield Replacement project in accordance with the plans (Drawings), AGREEMENT, and specifications prepared therefore by Kleinfelder, for the contact price specified below, according to the terms of the Contract Documents and as stated below.

B. This bid includes Addenda numbered _____ through _____ ***.
*** To be filled in by bidder if addenda are issued.

C. **Base Bid** (Total Part I and Part II) for the proposed contract price of:

_____ Dollars
(Amount in Words)

\$ _____
(Amount in Figures)

NOTE: Bidders must bid on each item, as failure to do so grounds for rejection of the Bid. All entries in the entire BID must be made clearly and in ink. In case of discrepancy between prices in writing and in figures; the writing shall govern. In case of discrepancy between the product obtained by multiplying the estimated quantity by the unit price, and the extended amount, the product obtained shall govern. In case of discrepancy between total of Extended Totals and Total Price of bid stated, total of Extended Totals shall govern.

Refer to Section 01153 - Measurement and Payment for Item Descriptions.

F. The subdivisions of the **Base Bid** are as follows:

PART I (Item 1) - The work of the General Contractor, being all work other than that covered by Part II (Item 2) inclusive as follows.

Item No.	Description	Estimated Quantity	Extended Total
1.	_____ Dollars (\$) Lump Sum	LS	\$

Total Price Part I: \$ _____
(Amount in figures)

Dollars

(Amount in Words)

PART II (Item 2) – Sub-bids as follows:

Item No. 2	Sub-trade	Name of Sub-bidder	Amount	Bond required indicate by “Yes” or “No”
2.	Electrical		\$	

Total Price Part II: \$ _____

(Amount in words)

The basis of award shall be the amount of the Base Bid (Total Part I and Part II).

The undersigned agrees that the above-named subbidder will be used for the work indicated at the amount stated, unless a substitution is made. The undersigned further agrees to pay the premiums for the performance and payment bonds furnished by subbidder as requested herein and that all of the cost of all such premiums is included in the amount set forth in Item 1 of this bid.

The undersigned agrees that for extra work, if any, will be performed in accordance with Article 10 of the General Conditions of the Contract and will be paid for in accordance with Article 11 of the General Conditions of the Contract.

The undersigned agrees that if he is selected as general contractor, he will promptly confer with the Owner (awarding authority) on the question of subbidder; and that the Owner may substitute for subbid listed above a subbid duly filed with the Owner by another subbidder for the subtrade against whose standing and ability the undersigned makes no objection; and that the undersigned will use all such finally selected subbidder at the amount named in their respective subbid and be in every way as responsible for them and their work as if they had been originally named in the general bid, the total contract price being adjusted to conform thereto.

The undersigned agrees that, if he is selected as general contractor, he will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof by the Owner (awarding authority), execute a contract in accordance with the terms of this general bid and furnish a performance bond and also a payment bond, each of surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Owner and each in the sum of 100 percent of the contract price, the premiums for which are to be paid by the general contractor and are included in the contract price.

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 MGL Chapter 149, Section 44A.

The bid security accompanying this BID shall be in the amount of 5 percent of the BID.

If this BID is accepted by the Owner, the undersigned agrees to complete the entire work provided to be done under the Contract within 120 calendar days as stipulated in the AGREEMENT. Liquidated damages for each calendar day of delay shall be \$1,000 as stipulated in the AGREEMENT.

The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

(SEAL) _____ L.S.
(Name of Bidder)

By _____
(Signature and title of authorized representative)

(Telephone)

(Business address)

(Fax Number)

(City and State)

(Email Address)

Date _____

Bidder is required to execute and return with submitted Bid the following sections:

- 1. Bid Bond or Certified Check in amount of 5% of bid (Page 00410-1 or Bond Company Certificate).**
- 2. Completed Bid Form (00301-1 – 00301-3)**
- 3. Acknowledgement of Addenda (Page 00301-1)**
- 4. Certificate as to Payment of State Taxes (Page 00301-5)**
- 5. Certificate of Corporate Bidder (Page 00301-6 or standard Corporate Vote document)**
- 6. Certificate of Eligibility (DCAM CQ-1) issued by the Deputy Commissioner of the Division of Capital Planning**
- 7. Update Statement (DCAM CQ-3), attached to these specifications as Appendices C and D)**

Failure to submit these items with the bid shall be cause for rejection of bid by the Owner.

CERTIFICATE AS TO PAYMENT OF STATE TAXES

Pursuant to M.G.L. Ch. 62C Sec. 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.

Social Security Number of Federal
Identification Number

Signature of Individual or Corporate Name

Corporate Officer (if applicable)

CERTIFICATE AS TO CORPORATE BIDDER

I, _____, certify that I am the _____ of the Corporation named as bidder in the attached Bid Form; that _____, who signed said Bid Form on behalf of the bidder was then _____ of said Corporation; that I know his/her signature hereto is genuine and that said Bid Form was duly signed, sealed and executed for and in behalf o said Corporation by authority of its governing body.

(Corporate Seal)

By: _____
Name – Type or Print

Signature

This Certificate must be completed where Bidder is a Corporation and should be so completed by its Clerk. In the event that the Clerk is the person signing the Proposal on behalf of the Corporation, this certificate must be completed by another Officer of the Corporation.

END OF SECTION

- D. The undersigned agrees that, if he is selected as a subbidder, he will, within five days, Saturdays, Sundays, and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this subbid, and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, or if prequalification is required pursuant to section 44D 3/4, furnish a performance and payment bond of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.
- E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his own payroll and in the absence of a contrary provision in the specifications the name of each such class of work or part thereof and the bid price for each such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by the undersigned.]

- F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the Owner (awarding authority).
- G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the Owner (awarding authority).
- H. The undersigned offers the following information as evidence of his qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:
1. Have been in business under present business name _____ years.
 2. Ever failed to complete any work awarded? _____

3. List one or more recent projects with names of general contractor and engineer and value of sub-bid work on which you served as subcontractor for work of similar character as required for the above-named project.

<u>Project Name</u>	<u>Engineer</u>	<u>Gen'l Contractor</u>	<u>Project Value</u>
(a) _____	_____	_____	_____
(b) _____	_____	_____	_____
(c) _____	_____	_____	_____

4. Bank reference _____

- I. 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 of subcontracts subject to section forty-four F.

The undersigned further certifies under penalties of perjury that this sub-bid is in all respects bona fide and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

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.

(SEAL) _____ L.S.
(Name of Bidder)

By _____
(Signature and title of authorized representative)

(Telephone)

(Business address)

(Fax Number)

(City and State)

(E-Mail Address)

(Date)

The following shall be submitted with Sub-bids.

- 1. Bid Bond or Certified Check in amount of 5% of bid (Page 00410-1 or Bond Company Certificate).**
- 2. Completed Bid Form (Pages 00302-1 – 00302-3)**
- 3. Acknowledgement of Addenda (00302-1)**
- 4. Certificate as to Payment of State Taxes (Page 00302-5)**
- 5. Certificate as to Corporate Bidder (Page 00302-6)**
- 6. Certificate of Eligibility (DCAM CQ-1) issued by the Deputy Commissioner of the Division of Capital Planning**
- 7. Update Statement (DCAM CQ-3), attached to these specifications as Appendices C and)**

Failure to submit any of the required forms shall be cause for rejection of sub-bid by the Owner.

CERTIFICATE AS TO PAYMENT OF STATE TAXES

Pursuant to M.G.L. Ch. 62C Sec. 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.

Social Security Number of Federal
Identification Number

Signature of Individual or Corporate Name

Corporate Officer (if applicable)

CERTIFICATE AS TO CORPORATE BIDDER

I, _____, certify that I am the
_____ of the Corporation named as bidder in the attached Bid
Form; that _____, who signed said Bid Form on behalf of the
bidder was then _____ of said Corporation; that I know his/her
signature hereto is genuine and that said Bid Form was duly signed, sealed and executed
for and in behalf o said Corporation by authority of its governing body.

(Corporate Seal)

By:

Name – Type or Print

Signature

This Certificate must be completed where Bidder is a Corporation and should be so completed by its Clerk. In the event that the Clerk is the person signing the Proposal on behalf of the Corporation, this certificate must be completed by another Officer of the Corporation.

END OF SECTION

BID BOND

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

BIDDER (Name and Address):

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

OWNER (Name and Address):

BID

Bid Due Date:

Project (Brief Description Including Location): Salem Street Wellfield Replacement Project, Wilmington MA

BOND

Bond Number:

Date (Not later than Bid due date):

Penal sum

_____ (Words)

_____ (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

Attest: _____
Signature and Title

Note: Above addresses are to be used for giving required notice.

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

AGREEMENT
SECTION 00500A
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- ARTICLE 1 WORK
- ARTICLE 2 ENGINEER
- ARTICLE 3 CONTRACT TIMES
- ARTICLE 4 CONTRACT PRICE
- ARTICLE 5 PAYMENT PROCEDURES
- ARTICLE 6 INTEREST
- ARTICLE 7 CONTRACTOR'S REPRESENTATIONS
- ARTICLE 8 CONTRACT DOCUMENTS
- ARTICLE 9 MISCELLANEOUS

AGREEMENT

SECTION 00500A

TOWN OF WILMINGTON, MASSACHUSETTS
SALEM STREET WELLFIELD REPLACEMENT PROJECT

THIS AGREEMENT is dated as of the _____ day of _____ in the year 2021 by and between the Town of Wilmington, Massachusetts acting by and through its Town Manager, duly authorized therefor, who acts herein solely for said Town and without personal liability to itself, (hereinafter called OWNER) and

_____ (hereinafter called CONTRACTOR).

OWNER AND CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is as described in SECTION 01010, SUMMARY OF WORK.

ARTICLE 2. ENGINEER

The Project has been designed by Kleinfelder, Boston, MA who is hereinafter called ENGINEER and who is to act as OWNER'S representative, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIMES

3.1 The Work will be substantially completed within 120 consecutive calendar days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07 of the General Conditions.

3.2 Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense, and difficulties involved in proving the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER One Thousand Dollars and Zero Cents (\$1,000.00) for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete.

After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the time specified in paragraph 3.1 for completion and readiness for final payment or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER One Thousand Dollars and Zero Cents (\$1,000.00) for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment.

ARTICLE 4. CONTRACT PRICE

OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the prices stipulated in the CONTRACTOR's BID attached to this Agreement.

ARTICLE 5. PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

- 5.1 Progress Payments; Retainage. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, and in accordance with the applicable Massachusetts General Law during construction as provided in paragraphs 5.1.1 and 5.2 below. All such payments will be measured by the schedule of values established in paragraph 2.07 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.
 - 5.1.1 Progress payments will be made in an amount equal to 95 percent of Work completed (with the balance being retainage) but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with paragraph 14.02.B.5 of the General Conditions.
- 5.2 Final Payment. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

ARTICLE 6. INTEREST

All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston, Massachusetts.

ARTICLE 7. CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

- 7.1 CONTRACTOR has examined and carefully studied the Contract Documents (including the Addenda listed in Article 8) and the other related data identified in the Bidding Documents including "technical data."
- 7.2 CONTRACTOR has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, performance, or furnishing of the Work.
- 7.3 CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance, and furnishing of the Work.
- 7.4 CONTRACTOR has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02.A.1 of the General conditions. CONTRACTOR accepts the determination set forth in paragraph SC-4.02 of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which CONTRACTOR is entitled to rely as provided in paragraph 4.02 of the General Conditions. CONTRACTOR acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto. CONTRACTOR does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.
- 7.5 CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the site that relates to the Work as indicated in the Contract Documents.
- 7.6 CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the site, reports, and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- 7.7 CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract

Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 8. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

- 8.1 Invitation to Bid.
- 8.2 Instructions to Bidders.
- 8.3 CONTRACTOR's Bid.
- 8.4 This Agreement.
- 8.5 Performance, Payment, and other Bonds.
- 8.6 General Conditions EJCDC Document C-700, 2002 edition.
- 8.7 Supplementary Conditions.
- 8.8 Specifications as listed in table of contents thereof.
- 8.9 Drawings consisting of Sheets numbered 1 through 15 dated June 2021 bearing the following general title:

SALEM STREET WELLFIELD REPLACEMENT PROJECT
- 8.10 Addenda numbers _____ to _____, inclusive.
- 8.11 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All Written Amendments and other documents amending, modifying, or supplementing the Contract Documents pursuant to paragraph 3.04 of the General Conditions.

ARTICLE 9. MISCELLANEOUS

- 9.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.
- 9.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically, but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no

assignment with release or discharge the assignor from any duty or responsibility under the Contract Documents.

- 9.3 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.
- 9.4 Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, OWNER AND CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

This Agreement will be effective on _____, 2018 (which is the Effective Date of the Agreement).

OWNER _____
TOWN OF WILMINGTON, MA

CONTRACTOR _____

By: _____
TOWN MANAGER

By: _____
[CORPORATE SEAL]

Attest _____
TOWN COUNSEL

Attest _____

Address for giving notices:
121 Glen Road
Wilmington, MA 01887

Address for giving notices:

License No. _____

Agent for service of process: _____

The proposed expenditure is not in excess of the appropriation or the unexpended balance thereof.

(If CONTRACTOR is a corporation, attach evidence of authority to sign.)

Town Accountant

END OF SECTION

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NOTICE TO PROCEED

Dated: _____

TO: _____
(Contractor)

ADDRESS¹: _____

Contract: Salem Street Wellfield Replacement Project
(Insert name of Contract as it appears in the Contract Documents)

OWNER'S CONTRACT NO. _____

You are notified that the Contract Times under the above contract will commence to run on the date of this Notice to Proceed. By this date, you are to start performing your obligations under the Contract Documents. In accordance with Article 3 of the Agreement, the date of completion of all work is _____.

Before you may start any Work at the Site, paragraph 2.05.C of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must
(add other requirements)

(Owner)

By: _____
(Authorized Signature)

(Title)

Copy to ENGINEER

¹(Use Certified Mail, Return Receipt Requested)

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PERFORMANCE BOND

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

CONTRACTOR (Name and Address):

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

OWNER (Name and Address):

CONTRACT

Date:

Amount:

Description (Name and Location): Salem Street Wellfield Replacement Project, Wilmington MA

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

SURETY

(Seal)

Surety's Name and Corporate Seal

By:

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest:

Signature and Title

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

SURETY

(Seal)

Surety's Name and Corporate Seal

By:

Signature and Title

(Attach Power of Attorney)

Attest:

Signature and Title:

EJCDC No. C-610 (2002 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and

3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and

3.3. Owner has agreed to pay the Balance of the Contract Price to:

1. Surety in accordance with the terms of the Contract;
2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:

4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or

4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or

4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
2. Deny liability in whole or in part and notify Owner citing reasons therefor.

5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

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

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

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

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

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

12. Definitions.

12.1. Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.

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

12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

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

FOR INFORMATION ONLY – Name, Address and Telephone
Surety Agency or Broker
Owner's Representative (engineer or other party)

PAYMENT BOND

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

CONTRACTOR (Name and Address):

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

OWNER (Name and Address):

CONTRACT

Date:

Amount:

Description (Name and Location): Salem Street Wellfield Replacement Project, Wilmington MA

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

SURETY

(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____

Signature and Title

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

SURETY

(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

Attest: _____

Signature and Title:

EJCDC No. C-615 (2002 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, the American Institute of Architects, the American Subcontractors Association, and the Associated Specialty Contractors.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to Owner, this obligation shall be null and void if Contractor:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.

4. Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with Contractor:

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.

6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:

6.1. Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2. Pay or arrange for payment of any undisputed amounts.

7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.

8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

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

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

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

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

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

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

15. DEFINITIONS

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

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

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

**FOR INFORMATION ONLY – Name, Address and Telephone
Surety Agency or Broker:
Owner's Representative (engineer or other party):**

Certificate of Substantial Completion

Project: Salem Street Wellfield Replacement	Owner: Town of Wilmington, MA	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents: The following specified portions:

_____ Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [revised tentative] [definitive] list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer

Date

Accepted by Contractor

Date

Accepted by Owner

Date

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CHANGE ORDER

No. _____

Contract: Salem Street Wellfield Replacement Project

Date of Issuance: _____

OWNER: Town of Wilmington, MA

OWNER's Contract No. _____

CONTRACTOR: _____

ENGINEER: Kleinfelder

ENGINEER's Project No. _____

CONTRACTOR is directed to make the following changes in the Contract Documents.

1. Description of Work:
2. Purpose of Change Order:
3. Attachments: (List documents supporting change)

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIME
Original Contract Price \$ _____	Original Contract Time _____ (days or date)
Previous Change Orders No. ____ to No. ____ \$ _____	Net change from previous Change Orders _____ (days)
Contract Price prior to this Change Order \$ _____	Contract Time prior to this Change Order _____ (days or date)
Net (Increase/Decrease) of this Change Order \$ _____	Net (Increase/Decrease) of this Change Order _____ (days)
Contract Price with all approved Change Orders \$ _____	Contract Time with all approved Change Orders _____ (days or date)

RECOMMENDED:

APPROVED:

ACCEPTED:

By: _____
(Engineer)

By: _____
(Owner)

By: _____
(Contractor)

Date: _____

Date: _____

Date: _____

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Contractor's Application For Payment No. _____

	Application Period:	Application Date:
To (Owner): Town of Wilmington, MA	From (Contractor):	Via (Engineer): Kleinfelder
Project: Salem Street Wellfield Replacement	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.: 20202022.002A

APPLICATION FOR PAYMENT

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE	\$	
2. Net change by Change Orders	\$	
3. CURRENT CONTRACT PRICE (Line 1 ± 2).....	\$	
4. TOTAL COMPLETED AND STORED TO DATE (Column F on Progress Estimate)	\$	
5. RETAINAGE:		
a. ____ % x \$ _____ Work Completed	\$	
b. ____ % x \$ _____ Stored Material	\$	
c. Total Retainage (Line 5a + Line 5b)	\$	
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5c).....	\$	
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)	\$	
8. AMOUNT DUE THIS APPLICATION	\$	
9. BALANCE TO FINISH, PLUS RETAINAGE (Column G on Progress Estimate + Line 5 above)	\$	

CONTRACTOR'S CERTIFICATION

The undersigned Contractor certifies that: (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

By: _____ Date: _____

Payment of: \$ _____
(Line 8 or other - attach explanation of other amount)

is recommended by: _____ (Engineer) _____ (Date)

Payment of: \$ _____
(Line 8 or other - attach explanation of other amount)

is approved by: _____ (Owner) _____ (Date)

Approved by: _____ (Date)

Funding Agency (if applicable) _____ (Date)

Stored Material Summary

Contractor's Application

For (contract):					Application Number:				
Application Period:					Application Date:				
A	B	C	D		E		F		G
Invoice No.	Shop Drawing Transmittal No.	Materials Description	Stored Previously		Stored this Month		Incorporated in Work		Materials Remaining in Storage (\$) (D + E - F)
			Date (Month/Year)	Amount (\$)	Amount (\$)	Subtotal	Date (Month/Year)	Amount (\$)	
		Totals							

Notice of Award

Dated _____

Project: Salem Street Wellfield Replacement	Owner: Town of Wilmington	Owner's Contract No.:
Contract:		Engineer's Project No.: 20202022.002A
Bidder:		
Bidder's Address: (send Certified Mail, Return Receipt Requested):		

You are notified that your Bid dated _____, 2021 for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____

(Indicate total Work, alternates or sections or Work awarded.)

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

_____ copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award.
_____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within fifteen (15) calendar days of the date you receive this Notice of Award.

1. Deliver to the Owner [_____] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 17), General Conditions (Paragraph 5.01) and Supplementary Conditions (Paragraph SC-5.01).
3. Other conditions precedent:

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

Within twenty (20) days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

Owner

By: _____
Authorized Signature

Title

Copy to Engineer

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Engineers Joint Documents Committee

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

**STANDARD
GENERAL CONDITIONS
OF THE
CONSTRUCTION CONTRACT**

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By



PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

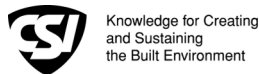
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The Associated General Contractors of America



Construction Specifications Institute

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National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314

American Council of Engineering Companies
1015 15th Street, N.W., Washington, DC 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*--The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*--The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

20. *Field Order*--A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*--A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *Schedule of Values*--A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *Site*--Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain

administrative requirements and procedural matters applicable thereto.

44. *Subcontractor*--An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

45. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *Work*--The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times

but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. Intent of Certain Terms or Adjectives

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. Day

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. Defective

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

- a. does not conform to the Contract Documents, or
- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
- c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. Furnish, Install, Perform, Provide

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 Copies of Documents

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement

or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 Starting the Work

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 Before Starting Construction

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule; indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 Preconstruction Conference

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 Initial Acceptance of Schedules

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or

responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work

(unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's

sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party..

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

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

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice*: If Contractor believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

- a. reviewing and checking all such information and data,
- b. locating all Underground Facilities shown or indicated in the Contract Documents,
- c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will

promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to

entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified

in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection

from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any

deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order .

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract

Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or

received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole,

3) it has a proven record of performance and availability of responsive service; and

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times, and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. Special Guarantee: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. Engineer's Cost Reimbursement: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract

Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. Contractor's Expense: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 Concerning Subcontractors, Suppliers, and Others

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual

or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. Removal of Debris During Performance of the Work: During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. Cleaning: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. Loading Structures: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Draw-

ings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples*: Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals , any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents

with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 Continuing the Work

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or

disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 Contractor's General Warranty and Guarantee

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 Indemnification

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or

arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal

shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and
2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and

properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect of purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep

Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show

partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall

promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

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

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and

Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have

resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. Costs Excluded: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall

be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. Cash Allowances

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an

allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted

by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to

be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
2. correct such defective Work; or
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress

payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent

inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

- a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
- b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
- c. there are other items entitling Owner to a set-off against the amount recommended; or
- d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 Contractor's Warranty of Title

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 Substantial Completion

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, , Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial

Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals

that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations

under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance

with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be

governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SECTION 00800A

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not specifically amended or supplemented hereby remain in full force and effect.

ARTICLE 1. DEFINITIONS

SC-1.01 (45)

Delete the definition of Substantial Completion in the General Conditions in its entirety and add the following in its place:

The Work required by the Contract has been completed except for work having a Contract Price of less than one percent of the then adjusted total contract price, or substantially all of the Work has been completed and opened to Owner's use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the Work required by the Contract.

SC-1.02

Delete paragraph 1.02.C of the General Conditions in its' entirety and insert the following in its place:

1.02.C Day

1. The word "day" means an 8-hour period of work conducted in a calendar day.

ARTICLE 2. PRELIMINARY MATTERS

SC-2.01

Delete paragraph 2.01.B of the General Conditions in its entirety and insert the following in its place:

2.01.B Before any work at the site is started, CONTRACTOR shall deliver to OWNER, with a copy to ENGINEER, certificates of insurance (and other evidence of insurance requested by OWNER) which CONTRACTOR is required to purchase and maintain in accordance with the requirements of Article 5.

2.01.B.1 Contractor shall include and identify on the certificate of insurance, indemnification as required by Article 6.20 of the General Conditions (Section 00700).

ARTICLE 3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01

Add the following new paragraphs immediately after paragraph 3.01.A of the General Conditions which is to read as follows:

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

3.01.A.2 Sections of Division 1 - General Requirements govern the execution of the work of all sections of the specifications.

ARTICLE 4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.02

Delete paragraphs 4.01.A and 4.01.B in their entirety

SC-4.03.D

Add the following new paragraph immediately after paragraph 4.03.C of the General Conditions which is to read as follows:

4.03.D Adjustments resulting from actual subsurface or latent physical conditions from those indicated will be in accordance with Massachusetts General Law, Chapter 30, Section 39N and the applicable provisions of the Contract Documents.

SC-4.05

Delete paragraph 4.05 in its entirety.

SC4.06

Delete paragraph 4.06 in its entirety.

ARTICLE 5. BONDS AND INSURANCE

SC-5.01

Amend General Conditions Paragraph 5.01B by adding the following language:

5.01B Every bid bond, every performance bond and every payment bond issued for any construction work in the commonwealth shall be the bond of a surety company organized pursuant to Section 105 of Chapter 175 or of a surety company authorized to do business in Commonwealth under the provisions of Section 106 of said Chapter 175 and be approved by the U. S. Department of Treasury and acceptable as sureties and reinsurers on federal bonds under Title 31 of the United States Code, sections 9304 to 9308.

SC-5.04

The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide the following coverages for not less than the following amounts or greater where required by Laws and Regulations:

5.04.A.1 and 5.04.A.2 Worker's Compensation, etc. under paragraphs 5.04.A.1 and 5.04.A.2 of the General Conditions:

- (1) Worker's Compensation as required by the laws of the Commonwealth of Massachusetts
- (2) Employer's Liability \$1,000,000

5.04.A.3, 5.04.A.4, and 5.04.A.5 Contractor's Liability Insurance under paragraphs 5.04.A.3 through 5.04.A.5 of the General Conditions which shall also include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody, and control of Contractor:

- (1) General Aggregate
(Except Products--Completed Operations) \$1,000,000
- (2) Products--Completed Operations Aggregate \$1,000,000
- (3) Personal and Advertising Injury (Per Person/Organization) \$1,000,000
- (4) Each Occurrence (Bodily Injury and Property Damage) \$1,000,000
- (5) Property Damage liability insurance Including Collapse and Underground coverage. If blasting is to be used, also include explosion coverage. \$1,000,000
- (6) Excess Liability:
 - General Aggregate \$5,000,000
 - Each Occurrence \$2,000,000

5.04.A.6 Automobile Liability:

(1)	Bodily Injury:	
	Each Person	\$1,000,000
	Each Accident	\$1,000,000
	Property Damage:	
	Each Accident	\$1,000,000
(2)	Combined Single Limit (Bodily Injury and Property Damage):	
	Each Accident	\$2,000,000

SC-5.04.B.4 The Contractual Liability coverage required by paragraph 5.04.B.4 in the General Conditions shall provide coverage for not less than the following amounts:

(1)	Bodily Injury:	
	Each Person	\$1,000,000
	Each Accident	\$1,000,000
(2)	Property Damage:	
	Each Accident	\$1,000,000
(3)	General Aggregate	\$2,000,000

SC-5.05

Delete paragraph 5.05 of the General Conditions in its entirety and insert the following in its place:

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

5.05.A.1 Bodily Injury:

Each Occurrence	\$1,000,000
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5.05.A.2 Property Damage:

Each Occurrence	\$1,000,000
Annual Aggregate	\$1,000,000

5.06

Delete paragraph 5.06A.2 in its entirety

ARTICLE 6. CONTRACTOR'S RESPONSIBILITIES

SC-6.06.D

Add the following new subparagraph as follows:

6.06.D.1 OWNER or ENGINEER may furnish to any such Subcontractor, Supplier, or other person or organization, to the extent practicable, information about amounts paid to CONTRACTOR in accordance with CONTRACTOR's Applications for Payment on account of the particular Subcontractor's, Suppliers, other person's, or other organization's Work.

SC-6.10

Add the following language at the end of paragraph 6.10.A of the General Conditions:

6.10.A.1 The materials and supplies to be used in the Work under this Contract are exempt from the Sales and Use Tax of the Commonwealth of Massachusetts. Contractor shall obtain the proper certificates, maintain the necessary records, and otherwise comply with all applicable requirements governing the exemption from sales tax.

Add the following language at the end of paragraph 6.12 of the General Conditions:

6.12.B Contractor shall prepare and maintain one (1) set of records of the work performed as specified in Section 01346 – As-Built Drawings.

SC-6.17

Add the following new paragraph immediately after paragraph 6.17.E of the General Conditions, which is to read as follows:

6.17. F The accuracy of all such information submitted by the Contractor is the responsibility of the Contractor. In reviewing Shop Drawings, Samples and similar submittals, the Engineer shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

ARTICLE 8. OWNER'S RESPONSIBILITIES

SC-8.06

Delete paragraph 8.06 of the General Conditions in its entirety.

ARTICLE 9. ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.04

Add the following new paragraph immediately after paragraph 9.04.A of the General Conditions which is to read as follows:

9.04.A.1 ENGINEER'S interpretations will be made in accordance with Massachusetts General Law, Chapter 30, Section 39P.

ARTICLE 10. CHANGES IN THE WORK; CLAIMS

SC-10.01.A

Add the following new paragraph immediately after paragraph 10.01.A of the General Conditions, which is to read as follows:

10.01.A.1 Upon request of the Owner or the Engineer, the Contractor shall without cost to the Owner submit to the Engineer, in such form as the Engineer may require, an accurate written estimate of the cost of any such proposed extra Work or change. The estimate shall indicate the quantity and unit cost of each item of materials, and the number of hours of work and hourly rate for each class of labor, as well as the description and amounts of all other costs chargeable under the terms of this Article. Unit labor costs for the installation of each item of materials shall be shown if required by the Engineer. The contractor shall promptly revise and resubmit such estimate if the Engineer determines that it is not in compliance with the requirements of this Article, or that it contains errors of fact or mathematical errors. If required by the Engineer, in order to establish the exact cost of new Work added or previously required Work omitted, the Contractor shall obtain and furnish to the Engineer bona fide proposals from recognized suppliers for furnishing any material included in such Work. Such estimates shall be furnished promptly so as to occasion no delay in the Work, and shall be furnished at the Contractor's expense. The Contractor shall state in the estimate any extension of time required for the competition of the Work if the change or extra work is ordered.

SC-10.01C

Add the following new paragraph immediately after paragraph 10.01B of the General Conditions, which is to read as follows:

10.01C All Change Orders shall be executed utilizing the form prepared by the Engineer. No other forms will be allowed unless otherwise required by Owner.

ARTICLE 11. COST OF THE WORK

SC-11.01

In the second sentence of paragraph 11.01.A.1 delete the word "superintendents".

Add the following language to the end of paragraph 11.01.A of the General Conditions to read as follows:

Following the Notice of Award and prior to the execution of the AGREEMENT, the OWNER, prospective contractor and, if any, each prospective filed subbid contractor shall agree on what percentage markup shall be used as direct labor costs in determination of extra work costs.

SC-11.02

Delete paragraph 11.02 of the General Conditions in its entirety.

ARTICLE 14. PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02

Add the following new paragraphs immediately after paragraph 14.02.A.1 of the General Conditions to read as follows:

The Contractor shall attest to or provide the following:

14.02.A.1.a The equipment or materials have been submitted and approved for use in this Project.

14.02.A.1.b The equipment or materials are acceptably stored and protected. Storage in a bonded warehouse will require proof of bonding, and insurance coverage specifically for the item being stored.

14.02.A.1.c The manufacturer's short and/or long term storage requirements have been received by the Engineer, prior to payment.

14.02.A.1.d The Contractor has established a program to implement the required storage procedures. Said program to consist of at the very least a written schedule of daily, weekly, monthly, routine maintenance requirements for each piece of equipment. A copy of this schedule to be presented to the Engineer prior to each requisition submittal, signed by the Contractor, stating that the required maintenance has been performed.

14.02.A.1.e Signed, notarized Title Transfers, format to be furnished by the Engineer, must be furnished for each item of equipment.

14.02.A.1.f When the above have been complied with to the satisfaction of the Engineer, payment will be authorized for the full invoice values of the item of equipment, less normal retainage and less all costs for materials testing, final acceptance testing, and installation.

ARTICLE 16. DISPUTE RESOLUTION

SC-16

Add the following new paragraph immediately after paragraph 16.01.C of the General Conditions to read as follows:

16.01. D CONTRACTOR shall carry on the Work and maintain the progress schedule during the dispute resolution proceedings unless otherwise agreed in writing by OWNER and CONTRACTOR.

ARTICLE 17. MISCELLANEOUS

SC-17.07

Add the following new paragraph immediately after paragraph 17.06 of the General Conditions as follows:

17.07 Legal Address of Contractor

17.07.A CONTRACTOR'S business address or his office at or near the site of the Work are both hereby designated as places to which communications shall be delivered. The depositing of any letter, notice, or other communication in a postpaid wrapper directed to the CONTRACTOR'S business address in a post office box regularly maintained by the Post Office Department or the delivery at either designated address of any letter, notice, or other communication by mail or otherwise shall be deemed sufficient service thereof upon CONTRACTOR, and the date of such service shall be the date of receipt. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by CONTRACTOR and delivered to ENGINEER. Service of any notice, letter, or other communication upon the CONTRACTOR personally shall likewise be deemed sufficient service.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 LOCATION OF WORK

- A. In general, the work to be done for the Town of Wilmington, under this contract, takes place at the following locations:
 - 1. Salem Street Satellite Pump Station located near 773 Salem Street. Wilmington, MA.

1.3 SCOPE OF WORK

- A. The work consists of installing and connecting three (3) new 18" by 24" diameter gravel pack wells with pitless adapters, submersible pump installation, water main installation, pump station upgrades including but not limited to removal of variable frequency drives, power panels, and electric heater unit, electrical upgrades needed for newly installed wells and installation of a split source heat pump. Work also includes decommissioning of the existing wells, site restoration, installation of new fence and raw water main cleaning from Salem Street and Brown's Crossing Wellfield Pump Stations to the Sargent Water Treatment Plant.
- B. Furnish all labor, materials, equipment and incidentals to construct wellfield and pump station upgrades complete and ready for operation as indicated on the Drawings and specified herein.
- C. The Work includes, but is not necessarily limited to, the following major items:
 - 1. Furnish, install and maintain all required straw wattles, siltation fence, landscaping materials, and other items required to comply with the Conservation Commission Order of Conditions (Appendix D) and/or the requirements specified hereafter.
 - 2. Furnish and install three (3) 18" by 24" diameter gravel pack wells and pitless adapters. Once installed wells shall be pumped to waste for at least 48 hours and the water quality samples shall be collected

for coliform bacteria, volatile organic compounds, secondary contaminants, nitrate, nitrite and per and polyfluoroalkyl substances (PFAS). All samples should be submitted to an analytical laboratory certified by the Commonwealth of Massachusetts and analyzed using drinking water analytical methods.

3. Furnish and install all exterior site water mains, fittings, valves, connections to existing mains, and all necessary appurtenances.
4. Furnish and install sampling station and necessary piping, fittings, and appurtenances.
5. Disinfect all newly installed wells and piping and obtain approval from DEP prior to activation.
6. Perform pressure testing and disinfection/dichlorination of water main and correct all failures, leaks and/or breaks at no additional cost to the Owner.
7. Decommissioning of existing wellfield in accordance with DEP Guidelines.
8. Perform all grading, excavating, dewatering, excavation support, backfilling and compacting for pipe laying, well installation, and well connections.
9. Perform raw water main internal cleaning from Salem Street Wellfield and Browns Crossing Wellfield pumping stations to the existing water main Sargent WTP.
10. Perform required demolition work and disposal within the pump station. Certain equipment identified to be demolished requires disconnection by the electrical subcontractor and demolition by the general contractor. This shall be coordinated by the general contractor with the electrical subcontractor.
11. Furnish and install electrical equipment including variable frequency drives, service wiring and connections including fittings and conduits as required.
12. Furnish and install new split system heat pump.
13. Restore all disturbed surfaces, utilities, signs, fences, walls, drives, curb lines, berms, lawns, shrubbery and landscaping disturbed during the well and water main installation work.
14. Perform installation of 950 square foot riparian restoration area.
15. Clean the pump station interior and wellfield site and remove erosion

controls in accordance with the Order of Conditions issued by the Wilmington Conservation Commission, included as Appendix B

16. Install new fence as indicated in the Drawings and tie into the existing fence at proposed locations. Remove existing as fence as shown on the Drawings.
 17. Handle and properly dispose of excess or unsuitable material.
- C. The work shall also conform to such additional Drawings and addenda to these Specifications and Drawings as may be published or exhibited prior to the opening of bid proposals and to such drawings in explanation of details, or as may be furnished by the Engineer from time to time during the construction.
- D. Work and materials which are necessary in the construction, but which are not specifically referred to in the Specification, or shown on the Drawings, but implied by the Contract shall be furnished by the Contractor at his own cost and expense and shall be such as will correspond with the general character of the work as may be determined by the Engineer, whose decisions as to the necessity for and character of such work and materials shall be final and conclusive. It is the intent of these Specifications to produce a complete, operational and finished project whether shown in every detail or not.

1.4 SCHEDULE

- A. Contract Completion time is 120 Calendar Days from Notice to Proceed. The existing Salem Street Raw Water Pump Station and wellfield can be taken off-line for a maximum period of 4 weeks. This period shall occur not prior to August 31, 2021. Therefore, well installation and testing, water main installation, and other critical exterior work shall be sequenced prior to taking the pump station and existing wellfield off-line. Critical pump station process work and electrical work that requires shut-down of the pumping system shall be sequenced to occur during the 4-week off-line period. See "Work Sequence," following this paragraph. The Contractor shall submit a separate, detailed schedule for the 4-week shut-down period per Section 01310 to the Engineer for review within 4-weeks of issuance of the Notice to Proceed.
- B. Prior to the existing Salem Street Raw Water Pump Station and wellfield being taken offline, the contractor shall clean the raw water main from the Salem Raw Water Pump Station and Browns Crossing Water Pump Station to the Sargent Treatment Facility. Raw water main cleaning will be completed prior to shutdown. Water main cleaning schedule shall be submitted two weeks in advance of cleaning.

1.5 WORK SEQUENCE

- A. Contractor is required to coordinate shut-downs with the Owner and subcontractors due to the required schedule as previously described. In

general, work shall be performed in the following sequence:

1. Prepare site, install erosion controls, demolish section of chain link fence, install and test new gravel pack wells, install pitless adapters, level transducers, and submersible pumps. Existing wells shall be shut down during active drilling of new wells.
2. Coordinate cleaning of raw water mains during drilling of new wells.
3. Install all exterior electrical conduits, electrical ductbanks, pipe, fittings and appurtenances which can be installed without shutdown of existing wells.
4. Coordinate shut down of Salem Street Raw Water Pump Station with Owner.
5. Demolish and remove VFDs and other electrical equipment as shown on the Drawings.
6. Decommission existing wells in accordance with MassDEP Standards.
7. Connect new wells to existing water mains as shown on the Drawings.
8. Furnish and install new electrical equipment and connections to new wells.
9. Install new split-system heat pump.
10. Coordinate installation and programming of new PLC with the Town's Integrator.
11. Pressure test and disinfect all new water mains and wells.
12. Install sampling station.
13. Startup and test equipment in accordance with specifications.
14. Pump new wells to waste for at least 48 hours and collect required water quality samples.
15. Pending approval from MassDEP, place pump station in service.
16. Complete site work and install new chain link fence with new lockable gate.

1.6 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall limit the use of the premises for the performance of the Work and storage of materials and equipment to allow for the safe use of the pump station by the Owner.
- B. Contractor shall coordinate with Owner, access for mechanical and electrical work inside the pump station building.
- C. Contractor shall assume full responsibility for security of all his and his subcontractors' materials and equipment stored on the site.
- D. If directed by the Owner, Contractor shall move stored items which interfere with operations of Owner.
- E. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.7 UNDERGROUND UTILITIES

A. The underground utilities indicated on the drawings have been located primarily from information furnished by others and are considered approximate both as to size and location. There are additional utilities to be encountered that are not shown on the drawings, and it shall be the Contractor's responsibility to locate all existing utilities and to protect same from damage or harm. All utilities interfered with or damaged shall be properly restored, at the expense of the Contractor, to the satisfaction of its Owner.

B. The following is a partial list of Owners of Utilities:

Owner's Designated Emergency Spokesperson:
Joseph Lobao, Business and Utility Manager
Town of Wilmington – Department of Public Works
978-658-4711

Town of Wilmington – Department of Public Works
978-658-4481

Town of Wilmington – Police Department
978-658-5071 Emergencies: 911

Town of Wilmington – Fire Department
978-658-3346 Emergencies: 911

Dig Safe 1- 888-DIG-SAFE	National Grid 1-800-233-5325	Eversource Energy 1-800-592-2000
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Verizon 1-800-837-4966	AT&T 1-888-944-0447	Comcast Cable 1-800-934-6489
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RCN Cable 1-800-746-4726	Reading Municipal Light (Wilmington) 781-944-1342
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PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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SECTION 01040

PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
 - 1. Coordination.
 - 2. Administrative and supervisory personnel.
 - 3. General installation provisions.
 - 4. Cleaning and protection.
- B. Progress meetings and preconstruction conferences are included in Section 01200 – PROJECT MEETINGS.
- C. Requirements for the Contractor's Construction Schedule are included in Section 01300 – SUBMITTAL PROCEDURES.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 COORDINATION

- A. The general contractor shall be responsible for coordinating with, scheduling, and issuing instructions to the subcontractors. Certain interior pump station process and electrical work is subject to strict schedule provisions and will require close coordination between trades for timely execution.
- B. All required shut-downs of the pumping station and/or treatment plant shall be fully coordinated with the Owner and Engineer.

3.2 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Inspect the conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner, and at no additional cost to the Owner.
- B. Manufacturer's Written Instructions: Comply with manufacturer's written installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items, and at no additional cost to the Owner.
- D. Provide attachment and connection devices and methods for securing work. Secure work true to line and level. Allow for expansion and utility movement.
- E. Recheck measurements and dimensions before starting installation or erection.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material to prevent deterioration.
- G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

3.3 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Install protective covering to ensure protection from damage or deterioration.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading.
 - 2. Excessive internal or external pressures.
 - 3. Excessively high or low temperatures.
 - 4. Air contamination or pollution.

5. Water or ice.
6. Solvents.
7. Chemicals.
8. Heavy traffic.
9. Misalignment.
10. Unprotected storage.
11. Improper shipping or handling.
12. Theft.
13. Vandalism.

END OF SECTION

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SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Examination of site and conditions of construction.
 - 2. Establishment of lines and grades.
 - 3. Connections to existing facilities.
 - 4. Restoration and protection of public and private property.
- B. Related section includes the following:
 - 1. Section 01346 – As-Built Drawings

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. As-Built Drawings: The Contractor shall be responsible for maintaining a set of redline “as-built locations and dimensions of work”. The As-Built Drawings shall be submitted to the Owner at substantial completion of the project. See Section 01346.
 - 2. The Contractor shall submit copies of field records and record drawings each month with project invoices. Field data shall be updated each month as applicable.

1.4 PROJECT/SITE CONDITIONS:

A. Environmental Requirements:

1. Unfavorable Construction Conditions:

- a. During unfavorable weather, wet ground, or other unsuitable construction conditions, confine operations to work which will not be affected adversely by such conditions.
- b. No portion of Work shall be constructed under conditions which adversely affect quality or efficiency thereof, unless special means or precautions are taken to perform Work in manner acceptable to the Engineer.

B. Field Measurements:

1. Easements and Rights-of-Way:

- a. Easements and rights-of-way for utilities, if required, will be provided by the Owner.
- b. Confine construction operations within limits indicated on drawings and/or within limits of easements or public ways.
- c. Place construction tools, equipment, excavated materials, and pipeline materials and supplies, so as to cause least possible damage to property and interference with traffic.
- d. Contractor shall coordinate and obtain approval from the Business and Utility Manager for the location of construction staging areas on the site and within the pump station building.
- e. All proposed work is within 100 feet of a wetland area. No work shall commence until an approved Order of Conditions (OoC) has been issued by the Town of Wilmington Conservation Commission. The contractor will follow all permit requirements set forth in the OoC which is included in these Specification as Appendix B.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use new materials in restoration of existing facilities except where soil materials and plants may be reused, as appropriate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination of Site and Verification of Conditions:

1. Before starting operations, examine site to become acquainted with conditions to be encountered.
2. Verify exact locations of sewers, water mains, gas mains, above or below ground electrical wires, other utilities, conduits and structures which may interfere with work.
3. Contractor shall perform test pit excavations in locations where he feels information is required to perform the work.

3.2 APPLICATION

A. Connections to Existing Facilities:

1. Make connections to existing facilities as indicated on drawings or as specified.
2. Obtain permission from specific utility owners in writing prior to undertaking connections.
 - a. Protect facilities against deleterious substances and damage.
3. Plan in advance all connections to existing facilities which are in service.
 - a. All equipment, materials, and labor shall be on hand at time of undertaking connections to existing facilities in service.
 - b. Work shall proceed continuously if necessary to complete connections within the time designated by the Engineer.
 - c. Coordinate any disruptions to service with the Owner. Refer to schedule requirements in Section 01010.
4. Operation of valves or other appurtenances on existing utilities, when required, shall be performed by respective utility personnel.
 - a. Water distribution system valves shall be operated by the Town of Wilmington personnel only.
 - (1) A tight shutdown of existing Owner's valves are not guaranteed; Contractor shall control leakage past

valves to satisfaction of the Owner and Engineer and at no additional cost to the Owner.

- b. The Contractor shall give the Owner three working (3) days advance notice prior to performing any work requiring the operation of local water distribution system valves.

B. Restoration and Protection of Public and Private Property:

- 1. Protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by construction operations.
- 2. Restore all public and private property including pavement, surfacing, curbs, walks, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and landscaping to their original condition or better.

3.3 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 01063

MISCELLANEOUS REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. The Contractor shall conform to all miscellaneous requirements as herein specified.

1.3 INTERFERENCE WITH EXISTING WORKS

- A. 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 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 possible 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. Before starting work which will interfere with the operation of existing facilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.

The Contractor shall make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

- B. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting his operations to meet the above requirements.
- C. Existing wellfield and pumping station shall not be taken out of service before August 31, 2021. Coordinate any disruptions to service with the Owner.

1.4 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

- A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried

pipng. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 18 inches below the top surface of earth or the top surface of the subgrade under pavements.

1.5 WATERTIGHTNESS

- A. All structures, pipes, and equipment which are to contain water shall be watertight under all operating conditions for which they are intended. The Contractor shall furnish all labor, materials and equipment and do all work required by the Engineer to make all such parts of the work watertight, or to replace them if in the opinion of the Engineer any leakage is excessive. All such parts of the work filled with water for testing watertightness shall be left filled as ordered by the Engineer.

1.6 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 other acceptable materials.

1.7 CARE OF WATERCOURSES

- A. The Contractor shall maintain the flow in all watercourses, whether open channels or in pipes, in all sewers and other pipes interfered with in the line of work and convey the flow to a suitable point of discharge so as not to flow upon the work or create a nuisance. In the discharge of water removed from the excavations by pumping or by gravity similar precautions shall be observed.

1.8 MUNICIPAL REQUIREMENTS AND COMPLIANCE

- A. The Contractor shall apply for, obtain and comply with all permits required for the work taking place. Failure of the Contractor to perform work in accordance with municipal requirements shall be subject to stoppage of the work until the Contractor takes corrective actions. All costs related to such stoppages shall be at the Contractor's expense and at no additional cost to the Owner.
- B. Contractor is required to prepare a dewatering discharge plan and submit to the Engineer and the Wilmington Conservation Commission for approval prior to any discharges from dewatering activities.

- C. Contractor is required to follow the requirements specified in the approved Order of Conditions issued by the Wilmington Conservation Commission, included as Appendix D to these Specifications.

1.9 WORK IN PROXIMITY TO UTILITY LINES

- A. The Contractor shall be responsible for complying with all applicable Occupational Safety and Health Administration (OSHA) regulations when working near or adjacent to power and utility lines and conduit. Contractor shall coordinate work activity with utility companies. Shutdown of utilities shall be determined by the appropriate utility. No additional compensation will be made if shutdown is not permitted.
- B. If required, the Contractor shall provide insulating barriers in conformance with OSHA regulations and/or ground construction equipment to comply with OSHA regulations.
- C. All costs related to compliance with utility or OSHA requirements shall be included in Item 1 of the bid proposal.

1.10 VEHICULAR AND PEDESTRIAN ACCESS

- A. The Contractor shall maintain vehicular and pedestrian access to Salem Street Wellfield and Sargent Water Treatment Plant during the work performed under this contract. If it becomes necessary to limit access due to the work, the Contractor shall meet with the Business and Utility Manager and make all required arrangements to minimize impacts and inconveniences to the Town at no additional cost to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SCOPE OF WORK

- A. The work covered by this section consists of furnishing all labor materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.
- B. The control of environmental pollution requires consideration of air, water, and land, and involves management of noise and solid waste, as well as other pollutants.
- C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked siltation fence, seeding, mulching, or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area.
- D. Contractor is required to prepare a dewatering discharge plan in conformance with the Order of Conditions issued by the Wilmington Conservation Commission, attached in Appendix D of these Specifications.
- E. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.

- F. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Massachusetts Department of Environmental Protection and the Wilmington Conservation Commission.
- G. Schedule and conduct all work in a manner that will minimize the level of noise escaping the site, especially at night and on weekends.

1.3 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement.

1.4 NOTIFICATIONS

- A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.5 IMPLEMENTATION

- A. Prior to commencement of the work, meet with the Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.
- B. Remove temporary environmental control features, when approved by the Engineer, and incorporate permanent control features into the project at the earliest practicable time.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EROSION CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures such as

siltation basins, siltation fencing, hay check dams, mulching, jute netting, and other equivalent techniques shall be used as appropriate. Offsite surface water shall be diverted around the site to a downstream channel ahead of siltation barriers. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

3.2 PROTECTION OF STREAMS WETLANDS, AND SURFACE WATER

- A. Care shall be taken to prevent or reduce to a minimum any damage to any stream, drainage ditch, storm drain or sewer from pollution by debris, sediment, or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream. Such water will be diverted through a settling basin or filter before being directed into the streams.
- B. The Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water, or any storm drain. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.
- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action drawing or plan approved by the Massachusetts Department of Environmental Protection. Contractor shall submit to copies of approved contingency drawings or plans to the Engineer.
- D. Water being flushed from structures or pipelines after disinfection, with a chlorine residual of 2 mg/l or greater, shall be treated with a dechlorination solution, in a method approved by the Engineer, prior to discharge.

3.3 PROTECTION OF LAND RESOURCES

- A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.
- B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless

specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.

- C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.
- D. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-in. in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

Trees either within or outside established clearing limits, that are subsequently damaged by the Contractor and are beyond saving in the opinion of the Engineer, shall be immediately removed and replaced at no additional cost to the Owner.

- E. The locations of the Contractor's storage, and other construction building, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings.
- F. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling, and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon.
- G. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.4 PROTECTION OF AIR QUALITY

- A. Burning. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

- B. Dust Control. The Contractor will be required to maintain all excavations, embankments, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.
- C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of chlorides may be permitted with approval from the Engineer.
- D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer.

3.5 NOISE CONTROL

- A. The Contractor shall make every effort to minimize noises caused by his operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal (OSHA) regulations.

END OF SECTION

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SECTION 01153

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. The following subsections describe the measurement of and payment for the work to be done under the items listed in the BID.
 - 1. Estimates of lump sum items shall be based on a schedule of values dividing each such item into its appropriate component parts together with a quantity and a unit price for each part so that the sum of the products of prices and quantities will equal the Contract price for the item. This schedule shall be submitted by the Contractor for and must have the approval of the Engineer before the first estimate becomes due. Submit the schedule of values in accordance with the General Conditions and Section 01370.
- B. Each unit or lump-sum price stated in the BID shall constitute full compensation as herein specified for each item of work completed in accordance with the drawings and specifications, including cleaning up.
- C. The prices for those items which involve excavation shall include compensation for transportation and disposal of surplus excavated material, handling water, and installation of all necessary sheeting and bracing.
- D. In all items involving excavation, the price shall be based on doing the entire excavation in earth. Where rock is excavated, the price therefore shall be in addition to the cost of excavating earth, and no deduction will be made in the amount for earth excavation.
- E. If changes are made during construction to the Drawings and Specifications as issued, and should such changes increase or decrease the quantity of work to be done under the items bid in the proposal, cost adjustments will be made as stipulated in the General Conditions of the Contract.
- F. Payment for water mains installed but not satisfactorily disinfected and tested will be limited to 90% of their scheduled value. Upon submission of satisfactory test results to the Engineer, the remaining 10% retained will be allowed for payment. Payment value given is prior to normal 5% retainage.
- G. Each unit or lump-sum price stated in the BID shall include all required permit and license fees required to perform the work, and insurance, bond costs, overhead and profit.

1.2 ITEM 1 – SALEM STREET WELLFIELD REPLACEMENT

- A. The lump sum price for Item 1 shall constitute full compensation for the Salem Street Wellfield Replacement for all work other than that covered by Item 2, including but not limited to furnishing all labor, equipment and materials necessary to install new wells, piping, fittings, valves and appurtenances, decommission the existing wellfield as depicted on the Drawings, clean-up, record drawings, manuals, coordinating work with Owner's operations, scheduling, mobilization, site restoration, start-up and performance testing, training, permits, fees and licenses, bonds and insurance, and all other necessary work as indicated on the Drawings and as specified, and not included for payment elsewhere.
- B. Measurement and payment will be on the basis of the percentage of work complete as determined by the Engineer in accordance with the accepted schedule of values. Payment for mobilization shall be no greater than 5% of the base bid. However, until satisfactory installation and testing of the facility is complete, final acceptance and payment for the facility will be withheld.

1.3 ITEM 2 – ELECTRICAL WORK

- A. The lump sum price will constitute full compensation for the Electrical Work complete, including, but not limited to furnishing all labor, equipment and materials necessary to perform all Electrical Work specified in Division 16 of the Specifications, and shown on the Electrical Drawings (E-1 THROUGH E-6), testing, electrical permits, coordination with the general contractor, bonds and insurance, applicable fees, and all other necessary work as indicated on the Drawings and as specified, and not included for payment elsewhere.
- B. Measurement and payment will be on the basis of percentage of work completed as determined by the Engineer in accordance with the accepted schedule of values.

1.4 EXTRA WORK

- A. Extra work, if any, shall be performed in accordance with Article 10 of the General Conditions and will be paid for in accordance with Article 12 of the General Conditions.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 PRECONSTRUCTION CONFERENCE

- A. A preconstruction conference will be held between the Contractor, Electrical Subcontractor, the Engineer, the Owner, and applicable agency representatives to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.
- B. Contractor will be notified of the time, date and place where the preconstruction conference will be held.

1.3 PROGRESS MEETINGS WITH ENGINEER

- A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), hold general progress meetings monthly with times coordinated with preparation of payment requests. Meeting dates shall be established by the Engineer. Require every entity then involved in the planning, coordination or performance of work to be properly represented at each meeting. Include (when applicable) consultants, separate contractors (if any), principal subcontractors, suppliers/manufacturers/fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the work. Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, submittals, change orders, and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule. Determine how behind-time work will be expedited, and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work.
- C. Immediately following each progress meeting where revisions to the Progress Schedule/Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 3 working days after meeting. At intervals matching

the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies the general methods and requirements of submissions applicable to the following work-related submittals.
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
 - 4. Construction or Submittal Schedules.
 - 5. Or equal submittals.
- B. Additional general submission requirements are contained in Paragraph 6.17 of the General Conditions.
- C. Detailed submittal requirements will be specified in the technical specifications sections.

1.3 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

- A. Shop Drawings:
 - 1. Shop drawings, as defined in the General Conditions, and as specified in individual work sections include, but are not necessarily limited to: custom-prepared data such as piping layout, schedule information, setting diagrams, actual shopwork manufacturing instructions, custom templates, and coordination drawings.
 - 2. All shop drawings shall be submitted using a transmittal form approved by the Engineer. Submittal form shall include identification of transmittal number and specification section number.
 - 3. All shop drawings submitted by subcontractors for review shall be sent directly to the Contractor for approval. The Contractor shall be

responsible for their submission at the proper time so as to prevent delays in delivery of materials.

4. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

B. Product Data:

1. Product data as specified in individual sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and printed installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances including certificates of compliance and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications and recommended spare-parts listing, and printed product warranties, as applicable to the Work.

C. Samples:

1. Samples specified in individual sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
 1. Field measurements
 2. Field construction criteria
 3. Catalog numbers and similar data
 4. Conformance with the Specifications
- B. Each shop drawing, sample, and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field

measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in. x 17-in. and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Engineer a copy of each submittal transmittal form for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer.

1. Submittals received "WITHOUT" Certification Statement shall not be reviewed.
- C. If a shop drawing shows any deviation from the requirements of the Contract Documents, the Contractor shall make specific mention of the deviations in the Transmittal Form furnished by the Engineer and provide a description of the deviations in a letter attached to the submittal.
- D. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will not have responsibility therefor.
- E. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
- F. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.
 1. Manufacturer's printed installation instructions, a part of product data submitted to the Engineer will not be reviewed and are for informational purposes only.

1.5 "OR EQUAL"

- A. Should the Contractor seek approval of a product other than the brand or brands named in these specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the Contractor shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature.
- B. Manufacturers' standard data and catalog cut sheets will not be considered sufficient in themselves, and the Engineer will not be responsible for seeking

further data from the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product.

- C. The Contractor shall be responsible for all additional costs including license fees, foundation, piping and electrical work necessary to accommodate the proposed “or equal” equipment. Items which result in a cost reduction shall be presented and a change order reflecting 65% of the cost savings will be prepared and the contract price modified. Contractor shall prepare an itemized detailed cost savings breakdown and provide all backup and documentation to allow the Engineer to review the proposed savings. Engineer shall have final authority in determining the cost savings value.

1.6 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.
- B. All complete submittals shall be submitted sufficiently in advance of construction requirements to provide no less than fifteen (15) days, excluding Saturdays, Sundays and legal holidays for review from the time received at the Engineer’s reviewing office. For submittals of major equipment, that require more than fifteen (15) days to review, due to its sheer complexity and amount of detail and also requiring review by more than one engineering discipline, a letter will be sent by the Project Manager or his/her designee to the Contractor informing him/her of the circumstances and the date it is expected the submittal will be returned to the Contractor.
- C. Number of submittals required:
 - 1. Shop Drawings: Unless otherwise stated in the respective Specifications Sections, submit one (1) hard copy and one (1) digital copy consisting of a PDF file.
 - 2. Product Data: Unless otherwise stated in the respective Specifications submit one (1) digital copy consisting of a PDF file.
 - 3. Samples: Submit the number stated in the respective Specification Sections.
- D. Submittals shall contain:
 - 1. The date of submission and the dates of any previous submissions.
 - 2. The Project title and number.
 - 3. Contractor identification.
 - 4. The names of:
 - a. Contractor
 - b. Supplier

- c. Manufacturer
 - 5. Identification of the product, with the specification section number, page and paragraph(s).
 - 6. Field dimensions, clearly identified as such.
 - 7. Relation to adjacent or critical features of the Work or materials.
 - 8. Applicable standards, such as ASTM or Federal Specification numbers.
 - 9. Identification of deviations from Contract Documents.
 - 10. Identification of revisions on resubmittals.
 - 11. An 8-in. x 3-in. blank space for Contractor and Engineer stamps.
- E. Each shipment of drawings shall be accompanied by a transmittal form furnished by the Engineer giving a list of the drawing numbers and the names mentioned above.

1.7 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

- A. The Engineer's review is for general conformance with the design concept and contract drawings. Markings or comments shall not be construed as relieving the Contractor from compliance with the contract plans and specifications or from departures therefrom. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
- B. The review of shop drawings, data, and samples will be general. They shall not be construed:
 - 1. as permitting any departure from the Contract requirements;
 - 2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
 - 3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.
- C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.
- D. One digital copy of shop drawings or product data will be returned to the Contractor. Samples will not be returned.

- E. Submittals will be returned to the Contractor under one of the action codes indicated and defined on the transmittal form furnished by the Engineer.
- F. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing, on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.
- G. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.
- H. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.
- I. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.8 GENERAL PROCEDURES FOR SUBMITTALS

- A. **Coordination of Submittal Times:** Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval resubmittal (if required), coordination with other submittals, inspection, testing (off-site and on-site), purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

1.9 CERTIFICATION FORMS

- A. If specifically specified in other sections of these Specifications, the Contractor shall submit the applicable certification form for each item required, and in the form attached to this section, completely filled in and stamped.

1.10 CERTIFICATES OF COMPLIANCE

- A. Certificates of Compliance specified in the specifications shall include and mean certificates, manufacturer's certificates, certifications, certified copies, letters of certification and certificate of materials.
- B. The Contractor shall be responsible for providing Certificates of Compliance requested and specified in the technical specifications. Certificates are required for demonstrating proof of compliance with specification requirements and shall be executed in 6 copies unless otherwise specified. Each certificate shall be signed by an official authorized to certify on behalf of the manufacturing company and shall contain the name and address of the Supplier, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Supplier from furnishing satisfactory material, if after tests are performed on selected samples, the material is found not to meet the specific requirements. A certificate of design has been provided at end of the section.

1.11 PERMITS

- A. The Contractor shall obtain necessary permits to construct as required by the Town of Wilmington. All permit fees, bonds, etc., shall be included in Item 1. A copy of the permit shall be provided to the Engineer.
- C. Contractor is required to prepare a dewatering discharge plan in conformance with the Order of Conditions issued by the Wilmington Conservation Commission, attached in Appendix B of these Specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

CERTIFICATE OF DESIGN

The undersigned hereby certifies that he/she is a Professional Engineer registered in the state of _____ and that he/she has been employed by (Name of Contractor) _____ to design _____ in accordance with Specifications Section _____ for the (Name of Project) _____. The undersigned further certifies that he/she has performed similar designs previously and has personally performed or directly supervised the design of the _____; that said design is in conformance with all applicable local, state, and federal codes, rules, and regulations and professional practice standards; that his/her signature and Professional Engineer (P.E.) Stamp have been affixed to all calculations and drawings used in, and resulting from, the design; and that the use of that stamp signifies the full responsibility of the undersigned for that design.

The undersigned hereby certifies that he/she has Professional Liability Insurance or will be covered by an Employer Policy with limits of \$1,000,000.00 and a Certificate of Insurance is attached.

The undersigned hereby agrees to make all original design drawings and calculations available to the Town/City of _____ or Owner's representative within seven (7) days following written request therefore by the Owner.

P.E. Name

Contractor's Name

Signature

Signature

Title

Title

Address

Address

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Refer to Section 01010 for special scheduling requirements that affect this project.

1.2 SUMMARY

- A. CONTRACTOR shall prepare and submit to ENGINEER for review within 14-days after Notice to Proceed, a construction progress schedule for the overall project. A separate, detailed Critical Path Method schedule for the 4-week pump station shut-down period shall be submitted within 30-days after Notice to Proceed.
- B. Normal construction activity shall take place only between the hours of 7 a.m. to 4 p.m., excluding Saturdays, Sundays, and legal holidays. Work within the pump stations shall be between the hours of 7 a.m. to 3:30 p.m. No work beyond a five-day week or 8-hour day shall be allowed. If the Contractor wishes to work beyond the number of hours or days stated herein, he shall submit his request in writing to the Engineer for review. Contractor completion times will be adjusted to reflect extended work periods. However, emergency work may be done without prior permission. Shut-down of the existing system shall not happen before August 31, 2021.

1.3 FORM OF SCHEDULES

- A. Overall Project Schedule: Prepare in form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation.
 - 2. Horizontal time Scale: Identify first work date of each week.
 - 3. Scale and spacing to allow space for notations and future revisions.
- B. Shut-Down Period Schedule: Prepare in the form of a CPM Schedule.
 - 1. The Contractor shall submit copies of the CPM Network Schedule for review. This submittal shall have already been reviewed and approved by the Contractor's Project Manager, Project Superintendent, the

Project Estimator, and Electrical and other applicable Subcontractors prior to submission. The CPM Schedule shall be a time-scaled network diagram of the "i-j" activity-on-arrow or precedence type. The Network Diagram shall describe the activities to be accomplished and their logical relationships and show the Critical Path.

- C. Format of Listings: Chronological order of start of each item of work.
- D. Identification of Listings: By major specification section numbers.

1.4 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show complete sequence of construction by activity.
2. Show dates for beginning and completion of each major element of construction and installation dates for major terms of equipment. Elements shall include, but not limited to, the following:
 - a. Shop drawing submittal – review periods.
 - b. Material and equipment order and delivery.
 - c. Well installations.
 - d. Water main installation.
 - e. Testing and disinfection.
 - f. Connection to existing water mains.
 - g. Water main cleaning
 - h. Electrical Subcontractor's items of work.
 - i. Well and pump station start-up.
 - j. Backfilling, grading, seeding, and landscaping.
 - k. Wellfield decommissioning.
 - l. Final cleanup.
 - m. Allowance for inclement weather.
3. Show projected percentage of completion for each item as of first day of each month.

1.5 SCHEDULE REVISIONS

- A. Every 30 days CONTRACTOR shall revise construction schedule to reflect changes in progress of work.
- B. Indicate progress of each activity at date of submittal.
- C. Show changes occurring since previous submittal of schedule.
 1. Major changes in scope.
 2. Activities modified since previous submittal.

3. Revised projects of progress and completion.
 4. Other identifiable changes.
- D. Provide a narrative report as needed to define.
1. Problem areas, anticipated delays, and impact on schedule.
 2. Corrective action recommended and its effect.
 3. Effect of changes on schedules of other Contractors.

1.6 SUBMITTAL REQUIREMENTS

- A. For initial submittal of construction schedule and subsequent revisions thereof, furnish four (4) copies of schedule to Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01346

AS-BUILT DRAWINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:

- 1. As-Built Drawings:

- a. The Contractor shall maintain and keep a record copy of as-built drawings. The drawings shall show all materials as installed. A minimum of three (3) swingties to permanent structures shall be shown for all fittings, valves, corporation stops and any other item which will be backfilled upon completion of the work. As-built drawings shall also include pipe inverts and slopes of pipe runs. As-built drawings shall be kept current and will be reviewed monthly. Failure to maintain current as-built drawings will be cause to delay progress payments. As-built drawings shall be available to the Engineer at all times during the life of the Contract. Upon request, the Owner will provide one set of reproducible of the original Contract Drawings and a sample record drawing showing required style and quality, for this purpose.

General Contractor shall be responsible for coordinating, collecting and updating as-built drawings from subcontractors.

- 1) All drawings shall be made a part of the record drawings and shall include the following:

- a) Contract Drawings: Annotate or redraft, as required, to show all revisions, substitutions, variations, omissions and discrepancies made or discovered during construction concerning location and depth of utilities, piping, ductbanks, conduits, manholes, pumps, valves, vaults and other equipment. Revisions shall be made and shown on all drawing views with

actual dimensions established to permanent points.

- b) Working Drawings: Same as a) above, when working drawings are required. Include, for example, actual layouts of conduit runs between various items or electrical equipment for power, control and instrumentation; wire sizes, numbers and functions; configuration of conduits; piping layouts; and duct layouts. Sections and details shall be added as required, for clarity. Drawings and switchgear, motors, control centers and other equipment shall be revised to show actual installations.
- 2) Prior to preliminary inspection, furnish a reproducible of the record drawings. At the completion of the Contract and before final payment is made, furnish the Engineer one set of reproducible of the finally approved record drawings reflecting all revisions herein described.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Provide schedule of values covering each lump sum bid item.

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Schedule of values.
 - a. Revise and resubmit schedule until acceptable to the Engineer.
 - 2. Itemize separate line item cost for work involving each lump sum item.
 - a. Ensure that the sum of the items listed in the schedule of values for each lump sum item equals the price bid for the respective lump sum item.
 - b. For "Mobilization and Demobilization", items such as Bond premium and temporary construction facilities may be listed separately in the schedule, provided amounts can be substantiated.
 - 3. Break down installed costs into:
 - a. Delivered cost of product.
 - b. Total installed cost with overhead and profit.
 - (1) Do not list overhead and profit as separate items.
 - c. For water pipelines, include a breakdown for installation, testing, chlorinating and putting into service.
 - 4. An unbalanced schedule of values providing for overpayment on items of work performed first will not be accepted.

1.4 SEQUENCING AND SCHEDULING

- A. Prepare schedule of values covering each lump sum item after review of tentative schedule at preconstruction conference, but before submission of first application for payment.
- B. Before submitting any application for payment, obtain the Engineer's approval of the Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section covers Quality Assurance and Control requirements for this contract.
- B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors and suppliers and for assuring the quality specified in the Technical Specifications is achieved.

1.3 TESTING LABORATORY SERVICES

- A. All tests which require the services of a laboratory to determine compliance with the Contract Documents, shall be performed by an independent commercial testing laboratory engaged by the Contractor and acceptable to the Engineer. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.
- B. Preliminary Testing Services: Unless otherwise specified, the Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and shall pay all costs for services.
- C. Quality Control Testing Services: Perform all quality control tests in the field or in the laboratory on concrete, moisture-density (Proctor) and gradation tests on structural and embankment fills, and backfill materials, in-place field density tests on structural and embankment fills, and other materials and equipment, during and after their incorporation in the Work. Field sampling and testing shall be performed in the general manner indicated in the specifications, with minimum interference with construction operations. The Engineer shall determine the exact time and location of field sampling and testing, and may require such additional sampling and testing as necessary to

determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents.

- D. Arrangements for delivery of samples and test specimens to the testing laboratory will be made by the Contractor. The laboratory tests shall be performed within a reasonable time consistent with the specified standards. Furnish a written report of each test to the Engineer.
- E. Contractor shall furnish all sample materials and cooperate in the sampling and field-testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field, the Contractor shall furnish personnel and facilities to assist in the activities.
- F. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.
- G. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.
- H. The testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory to the Contractor. Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor within three days after each test is completed.

1.4 QUALITY ASSURANCE

- A. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.
- B. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. Material and equipment shall not be used by the Contractor for any purpose other than that intended or specified unless such use is authorized by the Engineer.

- C. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.5 MATERIALS AND EQUIPMENT

- A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.
- B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

1.6 FIELD TESTING

- A. The Contractor is also responsible for providing field-testing specified in the technical specification sections.
- B. The Contractor and its Subcontractor shall perform inspections, tests, and other services as required by the Contract Documents.
- C. Contractor shall provide twenty-one days notice to the Engineer so that the Engineer may witness Contractor and/or Subcontractors on site tests. The Engineer's witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 QUALITY CONTROL

- A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

- B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies will be made available to the Engineer upon request.
- C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer or Owner to supersede or void that responsibility.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 PLANT AND HOURS OF CONSTRUCTION

- A. Furnish plant and equipment which will be efficient, appropriate, and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time. If at any time such plant appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the plant equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.
- B. Normal construction activity shall take place only between the hours of 7 a.m. to 4 p.m., excluding Saturdays, Sundays, and legal holidays. Work within the pump station shall be between the hours of 7 a.m. to 3:30 p.m.
- C. No work shall take place on holidays without prior permission of the Owner and the Engineer. Work shall not occur after noon on the Friday preceding a 3-day holiday weekend, or after noon on days before legal holidays.

1.3 OCCUPYING PRIVATE LAND

- A. The Contractor shall not (except after written consent from the proper parties) enter or occupy with men, tools, materials, or equipment any land outside the right of way or property of the Owner. A copy of the written consent shall be given to the Engineer, prior to entering or occupying private property.

1.4 PIPE LOCATIONS

- A. 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 from laying and jointing different or additional items where required.

- B. Piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field.

1.5 DIMENSION OF EXISTING STRUCTURES

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

1.6 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, fencing, caution signs, lights, and other means to prevent accidents to persons and damage to property. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.
- C. Costs incurred for public safety personnel to address unsafe conditions shall be the responsibility of the Contractor.

1.8 INTERFERENCE WITH AND PROTECTION OF STREETS

- A. Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.
- B. Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore.
- C. The Contractor shall, at least 48 hours in advance, notify the Police, Fire and School Departments in writing, with a copy to the Engineer, if the closure of

a street or road is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

1.9 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Engineer.

1.10 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.
- B. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Protection and temporary removal and replacement of existing utilities and structures as described in this section shall be a part of the work under the Contract and all costs in connection therewith shall be included in Item 1 of the Bid Proposal.
- D. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Town is required, he may direct the Contractor, in writing, to perform the work. Work so ordered will be paid at the Contract unit prices, if applicable, or as extra work under Article 10 of the Supplementary Conditions. If relocation of a privately owned utility is required, the Contractor will notify the Utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Utility, and shall have no claim for delay due to such relocation. Utility company backcharges related to utility relocations

will be paid under the applicable bid item, or as extra work under Article 10 of the Supplementary Conditions, if no bid item exists.

- E. The Contractor shall notify all utility companies in writing at least 72 hours (excluding Saturdays, Sundays, and Legal holidays) before excavating in any public way. Contractor shall also notify Dig Safe (1-888-DIG-SAFE) at least 72 hours prior to start of work.

1.11 COOPERATION WITHIN THIS CONTRACT

- A. All firms or persons authorized to perform any work under this Contract shall cooperate with General Contractor and his Subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.

1.12 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.
- B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this section and elsewhere in the Specifications.
- C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

1.13 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at its own expense.
- B. All structures shall be protected in a manner approved by the Engineer. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor at his own expense and to the

satisfaction of the Engineer.

- C. If, in the final inspection of the work, any defects, faults or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein for at least the guarantee period described in the Contract Documents.
- D. The Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

1.14 TEMPORARY UTILITIES

- A. Temporary Light and Power: The Contractor shall at his own expense, provide his own temporary light and power as required, if necessary for the prosecution and completion of work.
- B. Temporary Telephone: The Contractor shall have installed at his own expense a job telephone for his use and for the use of the Engineer. The Contractor shall pay all phone charges.
- C. Temporary Water: Water for drinking purposes and other usage will be provided by the Contractor at his own expense.
- D. Sanitary Provisions: The Contractor shall provide and maintain sanitary accommodations for the use of his employees and the Engineer, as may be necessary to comply with the requirements and regulations of the local and state departments of health.

1.15 WATER SUPPLY

- A. The Contractor shall make arrangements and pay for all water necessary for construction, testing, and start-up purposes from the Town of Wilmington.
- B. No direct cross connections will be permitted between the public water supply and the new water mains, or any other point where the possibility of backflow of contaminate water exists. All connections to points where there is the possibility of backflow shall be arranged to prevent backflow of contaminated water and shall be approved by the local Backflow Prevention Inspector before they are put into operation.

1.16 ACCESS TO THE WORK

- A. The Contractor shall provide sufficient and proper facilities at all times for

inspection of all work under this project in preparation or in progress, by the Owner, the agents and employees of the Owner, by authorized representatives of the Federal Government, the Commonwealth of Massachusetts, and by the Engineer

- . B. The Contractor shall furnish the Engineer or his authorized representative and other personnel mentioned above with such facilities and assistance as are necessary to ascertain performance of the work in accordance with the plans and specifications.

1.17 DUST CONTROL

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of water as necessary, so as to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride, and it is allowed by local authorities, for more effective dust control, the Contractor shall furnish and apply the material as directed.
- B. Calcium chloride shall be commercial grade, furnished in 100 lb, 5-ply bags, stored under weatherproof cover and stacked alternately for ventilation. Application for dust control shall be at the rate of about 1/2 pound per square yard, unless otherwise directed by the Engineer.

1.18 POLLUTION CONTROL

- A. The Contractor shall conduct clean-up and disposal operations, as necessary, to comply with state and local ordinances and anti-pollution laws.
- B. Outdoor burning of rubbish and waste material on the site will not be permitted.
- C. Disposal of volatile fluid wastes (such as mineral spirits, oil, gasoline, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

1.19 PRECAUTIONS DURING ADVERSE WEATHER

- A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.
- B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means, which will result in a moist or a dry atmosphere according to the particular requirements of the work being

protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01568

EROSION CONTROL, SEDIMENTATION AND CONTAINMENT OF CONSTRUCTION MATERIALS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
- B. Wilmington Conservation Commission Order of Conditions located in the Appendices.

1.2 SUMMARY

- A. Provide all work and take all measures to control soil erosion resulting from construction operations, prevent flow of sediment from construction site, and contain construction materials (including excavation and backfill) within protected working area as to prevent damage to any stream or wetlands.
- B. Work and materials shall comply with the Wilmington Conservation Commission Orders of Conditions (hereinafter ‘Order of Conditions’) contained in the Appendix B of these specifications.

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Straw Wattles.
 - 2. Settling tanks.
 - 3. Siltation bags.
 - 4. Silt Fencing
 - 5. Erosion Control Blanket
- B. Approvals: Contractor is required to prepare a dewatering discharge plan for discharges from dewatering activities and submit to the Engineer for Approval. The plan is to be developed in conformance with the Order of Conditions.

1.4 QUALITY ASSURANCE

- A. Use acceptable procedures, including use of water diversion structures, diversion ditches, settling basins, and sediment traps.

- B. Operations restricted to areas of work indicated on drawings and area which must be entered for construction of temporary or permanent facilities.
- C. If construction materials are washed away during construction, remove materials from fouled areas.
- D. Stabilize diversion outlets by means acceptable to Engineer.
- E. Engineer has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct immediate permanent or temporary pollution control measures to prevent contamination of any stream or wetlands, including construction of temporary berms, dikes, dams, sediment basins, sediment traps, slope drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

PART 2 – PRODUCTS

2.1 STRAW WATTLES

- A. Wattles shall be a straw-filled tube of flexible netting material exhibiting the following properties. It shall be a machine-produced tube of compacted rice straw that is Certified Weed Free Forage, by a manufacturer whose principle business is wattle manufacturing. The netting shall consist of seamless, high-density polyethylene and ethyl vinyl acetate and contain ultra violet inhibitors.
- B. Light weight rolled erosion control straw or wood fiber blankets (RECB) rolled up to create a wattle type device shall not be allowed under this specification.
- C. The Wattle shall meet the minimum performance requirements of Table 1. The product must be guaranteed to meet all numeric performance values in Table 1 under the specific conditions as stated.

TABLE 1 – WATTLE PROPERTIES

Property	Test Method	Units	Min. Value
Mass per Unit Weight	Field Measured	(lbs/ft)	1.6
Dimension	Field Measured	(Dia/Inches)	8.0 - 9.0
Net Strand Thickness	Field Measured	(Inches)	0.030
Net Knot Thickness	Field Measured	(Inches)	0.055
Netting Unit Weight	Certified	(Ounces/ft)	0.35
Sediment Retention Capacity	Rainfall Sim. ¹	(lbs/ft)	30

Installed Free-Board Ht.	Field Measured	(Height/Inches)	6.0 — 7.0
Straw Fiber	Field Measured	Avg. Length (in)	3.0
Soil Loss ¹	Rainfall Sim. ¹	% Effectiveness	58 ²
De-Stabilizing Moisture	Rainfall Sim. ¹	% Retained (Max.)	11
Fiber Content	Certified	% Rice Straw	100

- D. Straw wattles shall be manufactured by R.H. Dyck Inc., Nilex Inc., California Straw Works, or approved equal.

2.2 SILT FENCE

- A. Silt fence for sedimentation barriers and erosion control shall be woven geotextile fabric having the following properties:

<u>Property</u>	<u>ASTM Test Method</u>	<u>Value</u>
Grab Strength	D4632	100 lbs. (minimum)
Permittivity	D4491	0.10 sec-1 (minimum)
Apparent Opening Size	D4751	20-30 Sieve Opening
Ultra-Violet Stability	D4355	70% (minimum)

2.3 SETTLING TANKS

- A. Settling tanks or constructed settling basins should be used during well development and discharge or during periods when dewatering water with high silt content. The settling tank shall be sized appropriately to reduce scouring velocity at the discharge (less than 1.0 ft/min) and allow the particles to settle prior to discharging. The tank shall be set up outside of the bordering vegetated wetland.
- B. All discharged water shall be not discharged directly to resource areas. It shall infiltrate the ground by use of a siltation bag, or other non-direct method as approved by the Engineer. Discharge locations shall be approved by the Engineer.

2.4 SILTATION BAG

- A. The siltation bag shall be a nonwoven bag made from geotextile fabric with seams test strength of a minimum 60 lb/in. in accordance with ASTM D-4884.
- B. Each bag shall have an inlet spout large enough to accommodate a 4-inch discharge hose. The bag shall be secured to the hose using straps to prevent pumped water from escaping without being filtered.
- C. Siltation bag shall have a minimum capacity of 80 gal/min./ft².

D. The geotextile fabric shall have the following properties:

Weight	ASTM D-3776	8 oz./yd.
Grab Tensile	ASTM D-4632	203 lbs
Puncture	ASTM D-4833	130 lbs
Flow Rate	ASTM D-4491	80 gal/min./ft ²
Permitivity	ASTM D-4491	1.5 sec. ⁻¹
Mullen Burst	ASTM D-3786	400 lbs/in. ²
UV Resistant	ASTM D-4355	70%
AOS % Retained	ASTM D-4751	100%

E. Siltation bags shall be used as directed by the Engineer. Siltation bags shall be installed, used, and maintained in accordance with the manufacturer's instructions.

F. Dispose of siltation bags as directed by the Engineer.

2.5 EROSION CONTROL BLANKET

A. Erosion Control Blanket: All seeded areas shall have erosion control protection as specified below:

1. On all grassed or otherwise seeded slopes greater than or equal to 2H:1V a degradable geotextile fabric erosion control blanket shall be used and shall consist of 70% agricultural straw and 30% coconut fiber matrix. This shall also serve as an erosion control blanket for stormwater drainage swale, as shown on the Drawings. The coconut-straw erosion control blanket shall have a functional longevity of 24-months or longer and provide protection against flow velocity up to 8.0 feet per second. The coconut-straw erosion control blanket shall be North American Green SC150, or approved equivalent, and shall meet the following minimum physical property values:

PROPERTY	UNIT	TEST METHOD	MINIMUM VALUE
Thickness	in.	ASTM D55199	0.34
Resiliency	percent	ECTC Guidelines	75
Mass per Unit Area	ounce/s.y.	ASTM D6475	11.44
Water Absorption	percent	ASTM D1117	200
Swell	percent	ECTC Guidelines	30
Stiffness/Flexibility	Ounce-inch	ASTM D1388	1.11
Light Penetration	percent	ECTC Guidelines	11.70
Smolder Resistance	n/a	ECTC Guidelines	Yes
MD Tensile Strength	Lbs./foot	ASTM D5035	205.20
MD Elongation	percent	ASTM D5035	28.0
TD Tensile Strength	Lbs./foot	ASTM D5035	152.40
TD Elongation	percent	ASTM D5035	23.1

MD – Machine direction
TD – Transverse direction
ECTC – Erosion Control Technology Council

- B. All materials shall be delivered to the site in original unopened packages, showing weight, manufacturer's name, and guaranteed analysis. Materials shall be stored in such a manner that their effectiveness and usability will not be diminished or destroyed, and shall be uniform in composition, dry, unfrozen, and free flowing.

PART 3 – EXECUTION

3.1 GENERAL

- A. Do not discharge chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste into or alongside any body of water or into natural or man-made channels.

3.2 INSTALLATION

- A. Install sedimentation barriers in all locations as directed, surrounding base of all deposits of stored excavated material outside of disturbed area, and where directed by the Engineer.
- B. Install sedimentation barriers immediately after site is cleared and before trench excavation and drilling. Locate sedimentation barriers, surrounding stored material, approximately 6 ft. from material.
- C. Hold wattles in place with stakes as shown on the Drawings so that each wattle overlaps ad-joining wattle thereby precluding short-circuiting of erosion check.
- D. Construct earth berms or diversions to intercept and divert runoff water from critical areas.
- E. Protect catch basins from sedimentation by installing straw wattles around the basin or siltation fabric under grating casting.
- F. Discharge silt-laden water from excavations onto filter fabric mat and/or baled hay or straw sediment traps to ensure that only sediment-free water is returned to watercourses.
- G. Do not place excavated soil material adjacent to water-course in manner that will cause it to wash away by high water or runoff.
- H. Prevent damage to vegetation by excessive watering or silt accumulation in the discharge area.

- I. Do not dump spoiled material into any streams, wetlands, surface waters, or unspecified locations.
- J. Prevent indiscriminate, arbitrary, or capricious operation of equipment in streams, wetlands or surface waters.
- K. Do not pump silt-laden water from trenches or excavations into surface waters, streams, wetlands, or natural or man-made channels leading thereto.
- L. Prevent damage to vegetation adjacent to or outside of construction area limits.
- M. Do not dispose of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in streams, wet-lands, surface waters, or natural or man-made channels leading thereto, or unspecified locations.
- N. Do not alter flow line of any stream unless indicated or specified.
- O. Clean and dispose of debris from sedimentation barriers on a weekly basis.
- P. Upon completion of work and upon approval of Conservation Commission and Engineer, remove and dispose of sedimentation barriers.

END OF SECTION

SECTION 01610

DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.3 TRANSPORTATION AND DELIVERY

- A. Transport and handle items in accordance with manufacturer's printed instructions.
- B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.
- C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.
- D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.
- E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- F. Provide equipment and personnel to unload all items delivered to the site.
- G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.4 STORAGE AND PROTECTION

- A. Store and protect products in accordance with the manufacturer's printed instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him. Instructions shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.
- B. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.
- C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.
- D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01650

FACILITY START-UP/COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work covered under this section of the Specifications includes providing a technical service representative from the equipment manufacturers furnished under Sections 02673, 11210, 11215, and Division 16. The technical service representative shall oversee performance tests, acceptance tests and startup services.
- B. The Contractor shall be responsible for furnishing of all plant, labor, equipment, appliances and materials and performing all operations in connection with the final testing and inspection and startup and performance testing prior to final acceptance of all mechanical and process-related equipment, including the coordination of all performance tests and the furnishing of operating instructions for all equipment.

1.3 RELATED WORK

- A. Additional performance testing and startup requirements are specified and included in Division 16.
- B. Manufacturer training requirements are specified elsewhere in Divisions 16.

1.4 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Detailed test procedures shall be submitted at least fourteen (14) days prior to scheduled final inspection and testing date and the startup and performance testing date. This submittal shall include the proposed testing date for each piece of equipment, names of technical representatives who will perform equipment tests, testing record form supplied by the manufacturer to collect appropriate test data, any laboratory testing required, specific responsibilities of the Contractor and

technical service representative to prepare for and execute the test, and any electrical, water or waste disposal requirements for the test.

2. An inspection report prepared by the manufacturer's technical service representative summarizing the result of the final inspection and testing prior to startup shall be submitted. The report shall include certification that the equipment is properly installed and ready for operation and results of the test and adjustments performed.
3. Startup and performance test reports shall be submitted within fourteen (14) days of completion of the tests. The report shall include all information indicated in the detailed test procedures and any supplemental information from laboratory analysis, specified performance compared to actual performance test results, and if performance of equipment is not acceptable, a description of the actions to be taken prior to re-testing the equipment.

1.5 START-UP AND OPERATING INSTRUCTIONS

A. The Contractor shall be responsible for furnishing and installing all of the several kinds and types of equipment required in the pump station facilities, and for testing each individual piece of equipment, all combinations of equipment as they may operate one in conjunction with another, and the complete system, such that each component and the total unit may operate in an acceptable fashion to the Engineer, the Owner, and to any other municipal, State or Federal authorities within whose jurisdiction the operation of the facility may be a concern.

1. Equipment shall be tested for proper operation in the presence of the Engineer, and at no additional cost to the Owner.

B. Final Testing and Inspection of Equipment

1. Upon completion of installation of all permanent equipment deemed ready for operation by the equipment manufacturer, the manufacturer's technical service representative shall inspect, start-up, test and, as necessary, adjust and/or calibrate the equipment. The inspection shall consider the completeness and integrity of the installation, the alignment and clearances of the equipment parts with respect to each other, and the sufficiency of any required sealing, lubricants or packing.
2. The technical service representative shall submit the results of the inspection including certification that the equipment was properly installed and is operating as specified and as installed.

C. Start-up and Performance Testing

1. Fourteen (14) days notice of scheduled start-up and performance testing dates shall be given to the Engineer. The following representatives, as appropriate, shall be present simultaneously for the start-up and final performance test dates:
 - a. General Contractor
 - b. Pump Representative
 - d. Owner, Owner's Representative, and Owner's Instrumentation/SCADA Representative
 - e. Electrical Sub-Contractor

2. General Requirements
 - a. **If equipment is unable to operate, initial calibration and/or additional adjustments are required, or representatives are absent, the performance test shall be canceled at that time and full re-scheduling will be required.** Damages shall be assessed to the Contractor for Owner's, Owner's Representative, Owner's Instrumentation Representative and Manufacturer's Representative time and expenses wasted on scheduling, coordinating and attending the failed performance test.

 - b. Once the complete facility is fully tested, operational, calibrated and capable of performing, and approved by the Department of Environmental Protection, the Owner shall take occupancy of the equipment and the warranty period shall begin. It should be noted that the final performance test is meant to check complete performance of the equipment, and is not a time for contractors' or manufacturers' representatives to begin major calibrating, testing, and adjusting of their equipment to insure it works or performs as required.

 - c. All testing and related costs and fees shall be furnished by the Contractor and at no additional cost to the Owner. Additional testing performed as a result of test failures will be at no additional cost to the Owner.

3. Startup Activities
 - a. All mechanical and electrical equipment shall be checked to verify it is properly connected. Preliminary run-ins of mechanical equipment shall be done to verify that it is operating properly. All systems shall be cleaned of all debris and build-up.

- b. All pipelines and appurtenances shall be pressure tested and found to be acceptable.
 - c. Instruments: Contractor shall furnish standards, calibrated meters, and necessary instruments, labor, and equipment to test installed instruments under the direction of the Engineer. Units will be tested to determine their accuracy, precision and efficiency.
 - d. All safety equipment shall be installed and operating properly prior to any equipment operation or performance testing.
 - .
 - f. All spare parts, tools, lubricants shall be delivered to the Owner prior to the performance test of any equipment or systems.
4. Performance Tests:
- a. General: Full tests on all items and systems shall be made at the facilities after all equipment has been installed and a final testing and inspection and all startup activities have been satisfactorily conducted by the Contractor, and the Contractor is satisfied that the equipment is operating as specified. At no time during the startup of the facilities shall any equipment or system be operated under a more severe condition than the maximum design condition for which the equipment is rated.
 - b. Substantial completion and facility acceptance will not be issued until the full system tests are completed successfully. Satisfactory performance shall be considered achieved once the facility equipment and systems, including the related electrical and instrumentation systems, have been operated and meet all performance criteria for the specified time period. All wiring connections and instrumentation and control devices and signals shall be complete and function as a complete system.
 - c. Equipment to Meet Requirements: In the event of a failure to demonstrate satisfactory facility performance on the first or any subsequent attempt, it shall be the responsibility of the Contractor to make all the necessary and required changes, replacements, and tests to make the units meet the specified operating and efficiency requirements.
 - d. The Contractor shall be fully responsible for the operation and maintenance of the new equipment and systems until the performance test has been completed and substantial completion and facility acceptance has been issued.

- e. Instruments. Contractor shall furnish calibrated meters and necessary instruments, labor and equipment to make these required tests under the direction of the Engineer in order to test the units and determine their efficiency.

1.6 DISINFECTION

- A. Prior to final acceptance, the wells and the exterior and interior piping shall be disinfected and tested in accordance with Specification Sections 02671, 02675 and 02704.

1.7 GUARANTEE

- A. The Contractor shall guarantee the materials and equipment furnished and the performance thereof to be in accordance with the requirements of the Contract Documents and agrees upon written notice to make promptly and without charge, all necessary changes, corrections, and replacements (including installation of replacement parts) required to make good all defects developing in the material or equipment, under ordinary use and proper care, within a period of twelve months after the Engineer issues substantial completion of the facilities.
- B. The manufacturer's technical service representative shall be experienced in the installation, operation and testing of the equipment and/or system he/she shall be responsible for inspecting, starting up and testing. The manufacturer's sales representative shall not be provided as the technical service representative.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Provide in accordance with Section 01730 and as specified.
- B. Four (4) copies of the Operation and Maintenance Manuals shall be provided for each item of equipment, or system provided under Divisions 16. All elements and components of the equipment or system shall be included in the manual. Manuals with parts list shall be submitted for each item of equipment or system provided.
- C. The Operation and Maintenance Manuals shall be submitted prior to startup and final testing of equipment
- D. The Contractor shall be responsible for any malfunction of, or damage to the equipment or system resulting from incomplete or incorrect instructions in the manual for the guarantee period specified elsewhere in this Specification.

1.9 EQUIPMENT USAGE

- A. Any partial or full usage of the proposed equipment by the Owner, and/or his employees or agents, prior to acceptance shall be the responsibility of the Contractor.

1.10 OPERATIONAL EXPENSES

- A. During the construction stage and start-up period, before the facilities are turned over to the Owner, the Contractor shall bear all expenditures and operational expenses of all systems included in the project, including electrical power, maintenance, and fuel.
- B. The Contractor shall be responsible for the proper handling, sampling, lab testing and analysis, and disposal of all water and wastes generated from the testing and start-up of the facility.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Closeout procedures.
 - 2. Final cleaning.
 - 3. Adjusting.

1.3 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide Engineer with copies of all permits and test results upon completion of the work.
- C. Provide submittals to Engineer that are required by governing or other authorities.
- D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payment, and sum remaining due.
- E. Submit all warranties.
- F. Submit written notice that all subcontractors and suppliers have been paid in full.
- G. Submit written notice showing the disposition of all insurance filings and claims.
- H. Copy of "Statement of Compliance" filed with the Division of Labor and Workforce Development, as required under the State Wage Rate Provisions.

1.4 FINAL CLEANING

- A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - 1. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.5 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. All valve boxes and curb boxes shall be checked for straightness and alignment. All misaligned and non-centered boxes shall be corrected by the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. During its progress, the work and the adjacent areas affected thereby shall be cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
- B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.
- C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
- D. The Contractor shall thoroughly clean all materials and equipment installed by him and his sub-contractors, and on completion of the work shall deliver it undamaged and in fresh and new-appearing condition. All mechanical equipment shall be left fully charged with lubricant and ready for operation.
- E. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary driveway, walk, and landscaping work. Suitable materials, equipment, and

methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes procedural requirements for compiling and submitting operation and maintenance data required to complete the project.

1.3 RELATED WORK

- A. Section 01300: Submittals
- B. Section 01400: Quality Assurance
- C. Section 01740: Warranties and Bonds

1.4 OPERATING AND MAINTENANCE INSTRUCTIONS AND PARTS LISTS

- A. Where reference is made in the Detail Technical Specifications to operating and maintenance and spare parts lists, the Contractor shall furnish for each piece of equipment four (4) complete sets giving the information listed below.

- 1. The manual for each piece of equipment shall be a separate document with the following specific requirements:

- a. Contents:

- (1) Table of contents and index
- (2) Brief description of each system and components
- (3) Starting and stopping procedures
- (4) Special operating instructions
- (5) Routine maintenance procedures
- (6) Clean and concise manufacturer's printed operating and maintenance instructions, adjustment, lubrication and other maintenance of equipment including: parts list, illustrations, and diagrams
- (7) One copy of each wiring diagram
- (8) One copy of each approved shop drawing and each Contractor's coordination and layout drawing

- (9) List of spare parts, manufacturer's price, and recommended quantity
- (10) Name, address, and telephone numbers of local service representatives

b. Material:

- (1) Loose leaf on 60 pound, punched paper
- (2) Holes reinforced with plastic cloth or metal
- (3) Page size, 8-1/2-in. by 11-in.
- (4) Diagrams, illustrations, and attached foldouts as required of original quality, reproduced by dry copy method
- (5) Covers: oil, moisture, and wear resistant 9 X 12 size

- B. Such instructions and parts lists shall be completely and neatly annotated so that only the specific equipment and features furnished are clearly indicated. References to other sizes and types or models of similar equipment shall be deleted or neatly lined out.
- C. Such instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site. Each submittal shall be accompanied by a transmittal form identifying the information included. Each submittal shall be reviewed by the Engineer for compliance with the above requirements.
- D. If a submittal is acceptable, both copies will be retained by the Engineer. If deficiencies are found, one copy will be retained by the Engineer and one copy with the deficiencies, noted, will be returned to the Contractor. The copy retained by the Engineer shall not count toward the two complete acceptable sets required herein.
- E. At the Engineer's discretion, he may retain all four copies and request only supplemental information from the Contractor.

1.5 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project, names, addresses, and telephone numbers of Engineer, sub-consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone number of Subcontractors and suppliers; including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

- D. A list of all parts for the equipment with each part identified by a functional name, the part manufacturer's name and a unique part number, (normally the part manufacturer's alpha-numeric designation). A list of parts keyed by non-unique item numbers to a sectional drawing will not be adequate to fulfill this requirement.
- E. All components of each system, e.g., pump motor, coupling, and drive, shall be combined in a single submittal with the above data provided for each component.
- F. Drawings: Supplement product data to illustrate relations of component parts, and data applicable to installation. Delete inapplicable information.
- G. Type Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's printed instructions specified.
- H. Warranties and Bonds are as specified in Section 01740.

1.6 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's printed recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing, applicable reference standards, chemical composition, and details of installation. Provide printed recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual product specification sections.
- E. Provide a listing in Table of Contents for design data, if provided by Contractor, with tabbed fly sheet and space for insertion of data.

1.7 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. For each Item of Equipment and Each System provide the following:
 - 1. Description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include certified performance curves, with engineering data and tests,

and complete nomenclature and commercial number of replaceable parts.

2. Panelboard Circuit Directories including electrical service characteristics, controls and communications, and color coded wiring diagrams as installed.
3. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences; regulation, control, stopping, shut-down, and emergency instructions; and summer, winter, and any special operating instructions.
4. Maintenance Requirements:
 - a. Route procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 - b. Servicing and lubrication schedule, with list of lubricant type, frequency and method of lubrication. Any components which do not require lubrication or any expendable components which are not normally serviced shall be clearly noted as such.
 - c. Manufacturer's printed operation and maintenance instructions.
 - d. Sequence of operation by controls manufacturer.
 - e. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
 - f. Lubrication and maintenance schedules shall be similar to that specified in Section 01300.
5. Control diagrams by controls manufacturer as installed.
6. Contractor's coordination drawings, with color coded piping diagrams as installed.
7. Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
8. List of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
9. Test and balancing reports as specified.

10. Additional Requirements: As specified in individual product specification section.

B. Provide a listing in Table of Contents for design data, if provided by Contractor, with tabbed fly sheet and space for insertion of data.

1.8 INSTRUCTION OF OWNER PERSONNEL

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. Prepare and insert additional data in Operations and Maintenance Manual when need for such data becomes apparent during instruction.

D. Provide a completed and filled-out Equipment Manufacturer's Certificate of Installation, Testing and Instruction form attached to the end of this section.

1.9 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall arrange for a qualified service representative from each company manufacturing or supplying the following equipment:

- i. Submersible Well Pumps
- ii. Variable Frequency Drives

B. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before it is operated by others, the representative shall inspect, operate, test, and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:

1. Soundness (without cracked or otherwise damaged parts).
2. Completeness in all details, as specified.
3. Correctness of setting, alignment, and relative arrangement of various parts.
4. Adequacy and correctness of packing, sealing, and lubricants.

C. The operation, testing, and adjustment shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.

- D. On completion of his work, the manufacturer's or supplier's representative shall submit in triplicate to the Engineer a complete signed report of the result of his inspection, operation, adjustments, and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a Certificate of Compliance stating that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.
- E. After the Engineer has reviewed the reports from the manufacturers' representatives, the Contractor shall make arrangements to have the manufacturers' representatives present when the field acceptance tests are made.
- F. Refer and conform to the additional requirements specified in Section 01400.

1.10 NAMEPLATES

- A. With the exceptions mentioned below, each piece of equipment shall be provided with a substantial nameplate of non-corrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate.
- B. This requirement shall not apply to standard, manually operated hydrants or to gate, globe, check, and plug valves.

1.11 LUBRICANTS

- A. During testing and prior to acceptance, the Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this contract.

1.12 SPECIAL TOOLS

- A. For each type of equipment furnished by him, the Contractor shall provide a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.
- B. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.

- C. Special tools shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such special tools until completion of the work, at which time they shall be delivered to the Owner.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

EQUIPMENT MANUFACTURER'S CERTIFICATE OF INSTALLATION,
TESTING AND INSTRUCTION

Owner - _____
(fill in)

Project - _____
(fill in description)

Contract No. _____
(fill in)

EQUIPMENT SPECIFICATION SECTION NO. _____

EQUIPMENT DESCRIPTION _____

I _____, Authorized representative of
(Print Name)

(Print Manufacturer's Name)

hereby CERTIFY that _____
(Print equipment name and model with serial No.)

installed for the subject project (has) (have) been installed in a satisfactory manner, (has)
(have) been satisfactorily tested, (is) (are) ready for operation, and that Owner assigned
operating personnel have been suitably instructed in the operation, lubrication, and care of
the unit(s) on

Date: _____ Time: _____

CERTIFIED BY: _____ DATE: _____
(Signature of Manufacturer's Representative)

OWNER'S ACKNOWLEDGMENT OF MANUFACTURER'S INSTRUCTION

(I) (We) the undersigned, authorized representatives of the _____
_____ and/or Plant Operating Personnel have received classroom and hands-on instruction
on the operation, lubrication, and maintenance of the subject equipment and (am) (are)
prepared to assume normal operational responsibility for the equipment:

_____ Date: _____

_____ Date: _____

_____ Date: _____

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SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1.3 RELATED WORK

- A. Refer to General Conditions of the Contract for the general requirements relating to warranties and bonds.
- B. General closeout requirements are included in Section 01700 – CONTRACT CLOSEOUT.
- C. Specific requirements for warranties for the Work and products and installations that are specified to be warranted are included in the individual Sections of Division 2 through 16.
- D. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.4 SUBMITTALS

- A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.
- B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.
- C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document

that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for approval prior to final execution.

- D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.
- E. At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- F. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-in. by 11-in. paper.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification Section in which specified, and the name of the product or work item.
- H. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer, supplier, and manufacturer.
- I. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name, address, and telephone numbers of the Contractor and equipment supplier.
- J. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.5 WARRANTY REQUIREMENT

- A. **Related Damages and Losses:** When correcting 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. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.6 DEFINITION

- A. Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 02010

SUBSURFACE INVESTIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon transportation, disposal, handling, and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, groundwater table or similar physical conditions at the site, the conformation of subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with all available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work.
- B. The Contractor's attention is directed to Article 4 of Section 00700 - GENERAL CONDITIONS pertaining to Subsurface and Physical Condition.

1.3 SUBSURFACE DATA

- A. The location of test wells are shown on the Drawings and the logs of the test wells are included in Appendix A. Such data is offered in good faith solely for the purpose of placing the Contractor in receipt of all information available. The Contractor must interpret such data according to his own judgment and acknowledges that he is not relying upon the same as accurately describing the subsurface conditions which may be found to exist. The Contractor further acknowledges that he assumes all risk contingent upon the nature of the subsurface conditions, to be actually encountered by him in performing the work covered by the Contract, even though such actual conditions may result in the Contractor performing more or less work than he originally anticipated.
- B. There is no expressed or implied agreement that the depth or the character of the materials or any other information or data regarding the materials to be encountered in carrying out the work to be done under this contract have been indicated correctly, and it is understood that conditions affecting the cost or

quantity of the work to be done may differ from the conditions which may be indicated by the data obtained from the test well. It is agreed that the Contractor shall make for his own information all additional borings and tests necessary to enable him to fairly and accurately estimate the figures which he records in the Bid Proposal.

END OF SECTION

SECTION 02050

DEMOLITION AND ALTERATIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including The Agreement and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Demolish and alter existing facilities as indicated on drawings, as specified, and as directed by Engineer.
 - 2. Remove, salvage, or otherwise dispose of minor site improvements as specified in Section 02100, Site Preparation.
- B. Related sections include the following:
 - 1. Section 02100 - Site Preparation
 - 2. Section 02210 - Earth Excavation, Backfill, Fill and Grading.
 - 3. Division 16 - Electrical

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Submit to Engineer for review, a Demolition Plan describing proposed sequence, methods, and equipment for demolition, removal, relocation, and disposal of each item.

1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Demolish and remove existing equipment, piping, and appurtenances without damaging integrity of existing structures, equipment, and appurtenances that are to remain.

- C. Store equipment to be salvaged for relocation where directed by Engineer, and if necessary, protect from damage during work.
- D. Repair or remove items that are damaged. Repair and install damaged items at no additional compensation and to condition at least equal to that which existed prior to start of work.
- E. Exercise all precautions for fire prevention. Make acceptable fire extinguishers available at all times in areas where demolition work by burning torches is being done. Do not burn demolition debris on or near site.
- F. Protect persons and property throughout progress of work. Proceed in such manner as to minimize spread of dust and flying particles and to provide safe working conditions for personnel.
- G. Maintain circulation of traffic within area at all times during demolition operations for water and sewer department employees.
- H. Maintain access to and from entrance and exit points throughout demolition operations.
- I. Obtain permission from Engineer before abandoning or removing any existing structures, materials, equipment and appurtenances.
- J. Make arrangements with and perform work required by utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable codes and requirements for demolition of equipment and structures, safety of remaining structures, dust control, service utilities, and discovered hazards.
- B. Dispose of or recycle all demolition debris in accordance with all applicable regulations.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL

- A. Confine apparatus, storage of materials, demolition work, new construction, and operations of workmen to areas that will not interfere with continued use and operation of entire facility. Provide and maintain safe access.

- B. Cap or plug abandoned utilities, wall, floor and ceiling penetrations due to demolition, unless specified otherwise in the Drawings.

3.2 PREPARATION

- A. Notify Owner of procedures which may affect property, or potential noise, utility outage, or disruption. Coordinate with Owner.
- B. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy.
- C. Protect existing items, which are not indicated to be removed.

3.3 DEMOLITION REQUIREMENTS

- A. Conduct demolition in accordance with approved Demolition Plan, so as to minimize interference with pump station operation. Shut down of existing pump station shall not occur before August 31, 2021.
- B. Conduct operations with minimum interference to public or private accesses.
- C. Maintain protected access and egress at all times. Do not close or obstruct driveways and access to the facility without prior approval from the Owner.

3.4 SELECTIVE DEMOLITION

- A. Demolish and remove components in an orderly and careful manner.
- B. Protect existing equipment and utilities to remain.
- C. Confine apparatus, storage of materials, demolition work, new construction, and operations of workmen to areas that will not interfere with continued use and operation of the wellfield and pump station. Provide and maintain free and safe access.
- D. Upon removal of equipment, cut anchor bolts flush with concrete pads or floor.
- E. Items to be demolished/abandoned include, but are not limited to following:
 - 1. Salem Street Wellfield Pump Station:
 - a. Interior raw water process piping, valves, and appurtenances as shown on drawings.
 - b. Electrical equipment as shown on drawings.
 - c. Wells 9A and 9B.

- d. Existing concrete walkway and entry pad.
 - e. Portions of the existing chain link fence as shown on drawings.
- G. Existing functioning utilities located within the pump station shall remain in operation at all times until new utilities are provided to overtake their function.

3.5 REMOVE AND RELOCATION, SALVAGE

- A. All materials, equipment and appurtenance designated for salvage or reinstallation shall be protected during demolition to prevent damage. Furthermore, materials, equipment and appurtenances shall be labeled, cleaned and stored in a location designed by the Owner.
- B. Materials, equipment and appurtenances to be REMOVED, SALVAGED AND RETURNED TO THE OWNER by the Contractor to a location designated by the Owner are as indicated on the drawings.
- C. Materials, equipment, and appurtenances removed, that are not designated for relocation, or future use by Owner shall become property of the Contractor responsible for demolition. Haul from site and dispose of at no additional compensation.

3.7 CLEAN UP

- A. Remove demolished materials from site as work progresses.
- B. Leave areas of work in clean condition.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other material resulting from demolition operations. Transport and legally dispose of offsite.
 - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.
 - 2. Burning of removed materials is not permitted on project site.

3.9 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02100
SITE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Provide labor, material, tools and equipment to prepare site as indicated and specified.
 - 2. Protection of existing trees and vegetation outside the limit of work and specifically designated trees and vegetation within the limit of work which are not marked for removal.
 - 3. Prune trees, remove stumps and other vegetation as needed.
 - 4. Topsoil stripping.
 - 5. Clearing and Grubbing
 - 6. Disposal of excess materials.
- B. Related sections include the following:
 - 1. Section 02210: Earthwork.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 EXISTING TREES AND VEGETATION

- A. Avoid cutting or injuring trees and vegetation outside limit of work and outside areas to be cleared as indicated, without Engineer's permission. Protect existing trees from damage.

- B. Accept responsibility for damages outside these lines.
- C. Prune trees within limit of work as required to perform the work, or as designated by the Engineer.

3.2 EXISTING STRUCTURES AND PROPERTY

- A. Remove and reset at completion of project existing signs, posts, catch basin frames and grates, manhole frames and covers, and valve boxes within construction path unless directed otherwise.
- B. Store at a site designated by Owner, items in reusable condition as determined by Engineer.
- C. For work in loamed areas, strip loam to one side and stockpile loam to avoid mixing with excavation materials. Do not take loam from site.

3.3 CLEARING AND GRUBBING OPERATIONS

- A. Clearing and grubbing operations shall begin only after the limits of clearing have been determined in the field by the Engineer and Contractor.
- B. Cut or remove trees, brush, and other vegetable matter such as snags, bark and refuse, from areas to be cleared. Clear ground to width of work zone unless otherwise directed. No trees, other than those indicated on the plans, shall be removed without obtaining written approval from the Engineer and the Wilmington Conservation Commission.
- C. Cut trees, stumps, and stubs to be cleared, except where clearing done by machinery, as close to ground surface as practicable, but no more than 6 in. above ground surface for small trees and 12 in. for larger trees.
- D. All cleared trees and vegetation to be removed and disposed of offsite at no additional cost to Owner.

3.4 GRUBBING, STRIPPING, DISPOSAL

- A. Remove only those trees as directed on the plans.
- B. Utilize topsoil and loam insofar as possible for finished surfacing. Do not take loam from site.
- C. Promptly dispose off site material from clearing and grubbing not reused or stockpiled. In doing so, observe all applicable laws, ordinances, rules and regulations. Do not consider work completed until final cleaning, unless otherwise directed.

3.5 STOCKPILES

- A. Stockpiles shall be neatly trimmed and graded to provide drainage from surfaces and to prevent depressions where water may become impounded. All construction operations shall be performed so as not to cause mixing of objectionable materials with the topsoil, and stockpiles shall be protected and shall not be disturbed except for subsequent operations for replacing topsoil. Soil shall not be stockpiled outside the erosion controls or within 25 feet of the bordering vegetated wetland.

3.6 EXCESS TOPSOIL

- A. Topsoil which has been stripped and stockpiled, but is not needed after the completion of all final topsoiling and grassing shall be disposed of by the Contractor at no additional cost to the Owner.

3.7 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

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SECTION 02210

EARTHWORK, DEWATERING, AND SHORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes excavations of normal depth in earth for trenches and structures; backfilling such excavations to the extent required; filling; rough grading; coffer damming; miscellaneous earth excavation; dewatering; temporary excavation support; blasting; the removal, hauling and stockpiling of suitable excavated material for subsequent use in the work; all rehandling, hauling and placing of stockpiled materials for use in refilling, filling, backfilling, grading and such other operations; the removal and satisfactory disposal off the site of unsuitable material; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Backfill Materials: If new materials are to be utilized, submit a grain size analysis and curve performed in accordance with ASTM D422 for each proposed source of backfill for review by the Engineer. The grain size analysis shall indicate that the backfill material conforms to the gradation requirements specified.
- C. Excavation and Excavation Support Plan: For informational purposes only, and only if the excavation support method will be other than standard trench boxes, the Contractor shall submit the following prior to the start of the work, in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Submit within a minimum of four (4) weeks prior to construction, the qualifications of the Contractor's excavation support specialist. The excavation support specialist shall have completed at least five (5) successful excavation support projects of equal size and complexity and with equal systems within the last five (5) years.
 - 2. Submit a temporary excavation support plan stamped and signed by a Massachusetts Registered Professional Civil Engineer at least three weeks

prior to start of the construction. Submit design calculations that will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:

- a. Excavation support system, details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.
 - b. Submit the Certificate of Design: Form in Section 01300.
 - c. Requirements for dewatering during the construction.
 - d. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.
 - e. List of equipment used for installing the excavation support systems.
3. Estimates of the lateral and vertical displacements of the excavation lateral support systems under applied loads at critical stages.
 4. For excavation support systems designed to be left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:
 - a. Survey locations of the temporary excavation support systems, including coordinates of the ends and points of change in direction.
 - b. Type of the temporary excavation support system.
 - c. Elevations of top and bottom of the excavation support systems left in place.
 5. Submit a Construction Contingency Plan specifying the methods and procedures to maintain temporary excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.
- D. Submit a moisture-density curve indicating the maximum dry density and optimum moisture content as determined by ASTM D1557 for each proposed source of backfill for review of the Engineer.

- E. Dewatering Plan: Based on visual observations at the site, and given that the site is in the 100-yr floodplain, the Contractor shall anticipate that high groundwater will be present in the excavations and he/she shall be prepared to handle large amounts of groundwater at no additional cost to the Owner.

For informational purposes only, and only if the proposed dewatering will be other than standard sumps and pumps in the excavation, the Contractor shall submit the following prior to the start of the work, in accordance with Section 01300 - SUBMITTAL PROCEDURES:

1. Submit within a minimum of four (4) weeks prior to execution of any dewatering, the qualifications of the Contractor's dewatering specialist. The dewatering specialist shall have completed at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years.
2. Submit a detailed dewatering plan at least two weeks prior to start of any dewatering operation. Do not submit design calculations but submit working drawings for review by the Engineer. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:
 - a. The proposed type of dewatering plan and details. Submit a dewatering plan stamped and signed by a Massachusetts Registered Professional Engineer.
 - b. A list and description of equipment including, but not limited to, pumps, prime movers, and standby equipment, as well as the arrangement and location of system components.
 - c. Detailed description of dewatering, maintenance, and system removal procedures.
 - d. Erosion/sedimentation control measures, and methods of disposal of pumped water.
 - e. Types and sizes of sedimentation basins and filters, and dewatering tanks if required and site constraints prevent use of basins.
 - f. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.
3. Submit a modified dewatering plan within 24 hours, if open pumping from sumps and ditches results in boils, loss of fines or softening of the

ground.

- F. Submit the qualifications of the independent geotechnical testing laboratory performing soil testing and inspection services during earthwork operations. The geotechnical testing laboratory shall demonstrate to the Engineer's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM D3740, that it has the experience and capability to conduct required field and laboratory geotechnical testing. In addition, the laboratory shall be supervised by a Registered Professional Engineer in the State of Massachusetts.

1.4 EXCAVATION CLASSIFICATIONS

- A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for unauthorized excavation, additional excavation, or rock excavation.
- B. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.
 - 1. Under footings, foundations bases, concrete slabs, retaining walls or other structures, fill unauthorized excavations to the proper elevations with lean concrete. Elsewhere, backfill and compact unauthorized excavations as specified for excavations of the same class, unless otherwise directed by the Engineer.
- C. Additional Excavation:
 - 1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions.
 - 2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Engineer.
 - 3. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work or as provided for under the unit rates for this classification.
- D. Rock Excavation:
 - 1. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42-inch wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90HP flywheel power and 30,000 lb. drawbar pull.

Trenches in excess of 10 feet 0-inches in width and pits in excess of 30 feet 0-inches in either length or width are classified as open excavation.

2. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modern track-mounted heavy-duty excavating equipment without drilling, blasting or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170HP flywheel power and developing 40,000 lb. break-out force (measured in accordance with SAE J732C).
3. Determination of rock excavation classification shall be made by the Engineer. Typical of materials classified as rock are boulders 1.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent drilling, blasting or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Engineer. If the area to be excavated is preblasted prior to the excavation of overburden soils, the Engineer shall be notified at least two days in advance to allow observation of the preblast drilling by the Engineer in order to classify the excavation. Visual observation of the completed excavation may be made by the Engineer to modify the excavation classifications. Removal of rock excavation prior to classification by the Engineer shall be considered as earth excavation unless accepted by the Engineer in writing.

1.5 EXCAVATION

- A. The Contractor shall perform all excavations of every description and of whatever substances encountered, in a manner as required to allow for placing of temporary earth support, forms, installation of pipe, installation of conduits, necessary completion of gravel pack wells and other work, and to permit access to the Engineer for the purpose of observing the work. Excavation width shall be as shown on the drawings. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work; work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.
- B. All excavations made in open cut shall be controlled by the conditions existing at the various locations and shall always be confined to the limits as designated by the Engineer. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and pipelines as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth faced bucket or by hand if directed by the Engineer.

1.6 TEMPORARY EARTH SUPPORT

- A. The Contractor shall design, furnish, place and maintain such temporary excavation support systems as required to maintain lateral support and to prevent danger to persons or damage to pavements, facilities, utilities, or structures, and to prevent injurious caving or erosion or the loss of ground, and to maintain pedestrian and vehicular traffic as directed and required.
- B. Common types of excavation support systems include, but are not limited to, singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheetpile wall, timber sheetpile wall, trench box, or combinations thereof.
- C. Support systems shall be designed for earth pressures, hydrostatic pressure, equipment, temporary stockpiles, construction loads, and other surcharge loads.
- D. In all sheeting, shoring and bracing operations, care shall be taken to prevent injury to persons or damage to structures, roadways, facilities, pipelines, utilities and services. Any injuries to persons shall be the responsibility of the Contractor; and any damage to the work or existing structures occurring as a result of settlement, water or earth pressure, or other causes due to inadequate bracing or other construction operations of the Contractor shall be repaired by the Contractor at no additional cost to the Owner.
- E. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper installation, maintenance or design of the temporary excavation support systems. The Contractor shall pay for all claims, costs and damages that arise as a result of the work performed at no additional cost to the Owner.
- F. Where sheeting is to be used, it shall be driven ahead of excavation operations to the extent practicable so as to avoid the loss of material from behind the sheeting; where voids occur outside of the sheeting, they shall be filled immediately with selected fill, thoroughly compacted.
- G. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced temporary excavation support systems shall not be less than 5 feet [1.5 m] below the bottom of the excavation.
- H. Design temporary excavation support systems to withstand an additional 2- feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.
- I. The Contractor shall leave in place all sheeting and bracing at the locations and within the limits ordered by the Engineer in writing. The Contractor shall cut off the sheeting at elevations to be determined by the Engineer.

- J. The Contractor shall comply with all federal, state, and local safety regulations, and requirements.

1.7 DEWATERING SYSTEM

- A. The Contractor shall design, furnish, install, operate, maintain and remove at his own expense, a temporary dewatering system to ensure that work is performed under dry and stable conditions, free from groundwater and/or surface runoff. The temporary dewatering system shall be implemented so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. The Contractor shall implement erosion control measures (dewatering/siltation basin) for disposing of discharged water in order to prevent pumped drainage water from causing damage to adjacent property.
- B. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from these operations. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade, and modify system to perform as specified at no additional cost to the Owner. Precautions shall be taken to protect new work from flooding during storms or from other causes. Pumping shall be continuous where directed by the Engineer to protect the work and/or to maintain satisfactory progress.
- C. Notify the Engineer immediately if any settlement or movement is detected on structures. If the settlement or movement is deemed by the Engineer to be related to the dewatering, take actions to protect the adjacent structures and submit a modified dewatering plan to the Engineer within 24-hours. Implement the modified plan and repair any damage incurred to the adjacent structures at no additional cost to the Owner.
- D. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced and protected.
- E. Water from the trenches, excavations and drainage operations shall be disposed to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Engineer.
- F. The Contractor shall sample the waters receiving the dewatering discharge water and analyze the sample for turbidity. The Contractor shall provide up to four receiving water samples as directed by the Engineer over the duration of the work. The Contractor shall treat dewatering water with silt bags, sedimentation

equipment, filtration systems, and/or other approved means as necessary such that only discharge water that does not exceed the turbidity of the receiving waters is discharged. All dewatering discharging shall comply with the Conservation Commission's Order of Conditions contained in these contract documents.

- G. The Contractor shall control the grading in the areas surrounding all excavations so that the surface of the ground shall be properly sloped to prevent water from running into the excavated area. Where required, temporary ditches shall be provided for drainage. Upon completion of the work and when directed, all areas shall be restored by the Contractor in a satisfactory manner and as directed.

1.8 ROCK REMOVAL

- A. Blasting is not permitted.
- B. Rock, if encountered, shall be removed by impact hammer or other mechanical means.

1.9 SITE CONDITIONS

- A. Prior to submitting his bid, the Contractor shall review and understand all available information possible. The work is located where sewers, manholes, drainage piping, water mains and gas mains were previously installed.
- B. Additional test borings, test pits, or other exploratory operations may be made by the Contractor with the written approval of the Owner, at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 DEWATERING MATERIALS

- A. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.
- B. Provide and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.
- C. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.

2.2 TEMPORARY EXCAVATION SUPPORT MATERIALS

- A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.

- B. Steel Sheet Piling: ASTM A328, continuous interlocking type.
- C. Timber Lagging Left in Place: Pressured treated per appropriate AWPA standards.
- D. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.
- E. Raker Ties: ASTM A615 Grade 60.
- F. Cement Grout Materials And Admixtures For Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.
- G. Tamping tools adapted for backfilling voids after removal of the excavation support system.
- H. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

2.3 BACKFILL MATERIALS

- A. It is the intent of these specifications that soil materials excavated on the site shall be reused as backfill wherever possible. If new materials are required, they shall be in accordance with the following material requirements. In general, the material used for backfilling entrance/exit pit excavations and utility trench excavations shall be material removed from the excavations provided that the reuse of these materials results in the required trench compaction and meets the requirements specified for common fill.
- B. Common Fill: Common fill shall be soil containing no stone greater than 2/3 loose lift thickness. The materials shall be free of trash, ice, snow, tree stumps, roots and other organic and deleterious materials. Common fill shall not contain more than 30 percent by weight of silt and clay. It shall have a maximum dry density of not less than 110 pounds per cubic foot and it shall be of such a nature and character that it can be compacted to the specified densities in a reasonable length of time. Topsoil, silt and clay shall not be considered common fill.

Common fill shall be used as backfill outside limits of structures and pavement structures.
- C. Structural Fill: Structural fill shall consist of gravel and sand consisting of hard durable particles, and free from clay, trash, ice and snow, tree stumps, roots and other organic and deleterious or organic matter. Structural fill shall conform to the following gradation requirements.

Sieve Size	Percent Finer by Weight
8-inch	100 (1)
3-inch	70-100
1-inch	45-90
No. 4	20-70
No. 10	15-60
No. 40	10-40
No. 200	0-10
<u>(1) Four-inch maximum particle size within 12 inches of slab, footing or pavement grade.</u>	

Structural fill shall be used within the limits of structures.

- D Gravel: Gravel fill shall consist of hard, durable sand and gravel, and shall be free from ice and snow, roots, sod, rubbish, clay and other deleterious or organic matter. It shall conform to the following gradation requirements.

Sieve Size	Percent Finer by Weight
(a)	100
1/2-inch	50-85
No. 4	40-75
No. 10	---
No. 40	10-35
No. 100	(b)
No. 200	0-8
Notes: (a) Maximum grain size shall be four (4)-inches where placed as base below slab and pavement; elsewhere 2/3 of the loose lift thickness. (b) The amount passing the No. 100 sieve should be between 40 percent and 70 percent of the amount passing the No. 40 sieve.	

Gravel shall be used as sub-base course for pavement.

- E. **Crushed Stone:** Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone shall be uniformly blended and shall conform to the following requirements.

Sieve Size	Percent Passing by Weight	
	3/4-inch Stone	1/2-inch Stone
1-inch	100	---
3/4-inch	90-100	---
5/8-inch	---	100
1/2-inch	10-50	85-100
3/8-inch	0-20	15-45
No. 4	0-5	0-15
No. 8	---	0-5

Crushed stone shall be used as the working mat below structures, as well as for pipe bedding for piping larger than 3 inches diameter.

- F. **Sand:** Sand shall consist of clean inert, hard, durable grains of quartz or other hard durable rock, free from clay, organic, surface coatings or other deleterious material. Sand shall conform to the following gradation:

Sieve Size	Percent Passing by Weight
1/2-inch	100
3/8-inch	85-100
No. 4	0-20
No. 16	0-5
No. 100	0-2

Sand shall be used around 3" and smaller diameter pipe.

- G Filter Fabric: Filter Fabric used as a drainage medium shall consist of a fabric shall be inert to organic chemicals commonly encountered in soil.

The fabric shall conform to the following recommended property tests:

Property	Unit	Test Method	Minimum Value
Weight	oz/sy	ASTM D-3776	4.5
Grab Strength	lbs	ASTM D-4632	120
Grab Elongation	percent	ASTM D-4632	55
Trapezoid Tear Strength	lbs	ASTM D-4533	50
Mullen Burst Strength	psi	ASTM D-3786	210
Puncture Strength	lbs	ASTM D-4833	70
Apparent Opening Size (AOS)	U.S. std. Size Sieve	ASTM D-4751	70

Filter fabric shall be used as the separation layer between unsuitable native soil and the new backfill when unsuitable material is encountered.

The edges of filter fabric shall extend 1 ft up sides of trench.

PART 3 - EXECUTION

3.1 DEWATERING

- A. Execution of any earth excavation, installing earth retention systems, and dewatering shall not commence until the related submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed and the geotechnical instrumentation has been installed where applicable.
- B. Furnish, install and maintain dewatering system in accordance with the dewatering plan.
- C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of work ongoing or previously completed.
- D. Do not excavate until the dewatering system is operational.
- E. Discontinue open pumping from sumps and ditches if such pumping is resulting in boils, loss of fines, softening of the ground, or instability of the

slopes. Modify dewatering plan and submit to the Engineer at no additional cost to the Owner.

- F. Where subgrade materials are disturbed or become unstable due to dewatering operations, remove and replace the materials in accordance with this section at no additional cost to the Owner.
- G. Dewatering Discharge:
 - 1. Transport pumped or drained water to discharge location without interference to other work, damage to pavement and other surfaces, siltation of resource areas or property.
 - 2. Provide separately controllable pumping lines.
 - 3. The Engineer reserves the right to sample discharge water at any time.
 - 4. Immediately notify the Engineer if suspected contaminated groundwater is encountered. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations.
 - 5. Follow all recommended dewatering practiced outlined in the Order of Conditions (OoC) issued by the Wilmington Conservation Commission and included as Appendix B of these specifications.
- H. Install and maintain erosion/sedimentation control devices at the point of discharge as indicated or specified and in accordance with the dewatering plan.
- I. Do not remove dewatering system without written approval from the Engineer.

3.2 EXCAVATION SUPPORT SYSTEM

- A. Installation of the temporary excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed.
- B. Install excavation support systems in accordance with the temporary excavation support plan.
- C. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.
- D. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of work ongoing or previously completed.

- E. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.
- F. Notify utility owners if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owner's permission or have the utility owner make the modifications at no additional cost to Owner.
- G. Sheet piling shall be left in place unless otherwise indicated or approved in writing by the Engineer.
- H. When indicated or approved by the Engineer, remove the temporary excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of temporary excavation support systems with bank-run gravel, screened gravel or select borrow by tamping with tools specifically adapted for that purpose.
- I. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the work.
- J. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.
- K. Conduct survey of the locations and final cut-off elevations of the excavation support systems left in place.
- L. Submit as-built information, prior to backfilling.

3.3 FILLING AND BACKFILLING

- A. **Subgrade Preparation:** After the subgrade has been shaped to line, grade, and cross-section, it shall be thoroughly compacted. This operation shall include any required reshaping and wetting to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from the excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.
- B. **Backfill Material Selection:** Unless otherwise specified or directed, material used for filling and backfilling shall meet the requirements specified under Materials (Part 2.3).

In general, the material used for backfilling utility trench excavations shall be material removed from the excavations provided that the reuse of these materials results in the required trench compaction and meets the requirements specified

for common fill.

Maintain backfill material with uniform moisture content, with no visible wet or dry streaking, between plus 2 percent and minus 3 percent of optimum moisture content. The final filled soil mass shall be as uniform as possible in lift thickness, moisture content, and effort required to compact soil mass.

Backfill which is too wet for use shall be stockpiled, allowed to dry sufficiently, and reused by the Contractor at no additional cost to the Owner.

C. Trench Backfill:

1. Backfill shall consist of the following: structural fill six inches below and above the pipe; overlain by two feet of select common fill (no stones over 4 inches in diameter); overlain by common fill; overlain by gravel sub-base, or loam and seed. Trench backfill shall be compacted in accordance with Section 3.2.
2. The trenches shall be backfilled as soon as practicable.
3. All trench backfilling shall be done with special care and must be carefully placed so as not to disturb the work at any time; if necessary, a timber grillage or other suitable method shall be used to break the fall of material. The moisture content of the backfill material shall be such that proper compaction will be obtained. Puddling of backfill with water will not be permitted. Backfill within areas to receive topsoil or pavement construction shall be made to grades required to establish the proper subgrade for the placement of topsoil or pavement base courses.
4. Any trenches or excavations improperly backfilled or where settlement occurs shall be reopened, to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and condition, at no additional expense to the Owner.
5. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. If the observation of the pipelines shows poor alignment, displaced pipe or any other defects they shall be remedied in a manner satisfactory to the Engineer at no additional cost to the Owner.

D. Backfilling Against Structures:

1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been satisfactorily completed, special leakage tests of the structures shall be made by the Contractor, as required by the Engineer. After the satisfactory

completion of leakage tests and the satisfactory completion of any other required work in connection with the structures, the backfilling around the structures shall proceed using suitable and approved excavation material. Structural fill material shall be used for backfilling within 2 feet of the structure. Just prior to placing backfill, the areas shall be cleaned of all excess construction material and debris and the bottom of excavations shall be in a thoroughly compacted condition.

2. Symmetrical backfill loading shall be maintained. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures. During backfilling operations, care shall be exercised that the equipment used will not overload the structures in passing over and compacting these fills. Except as otherwise specified or directed, backfill shall be placed in layers not more than 12-inches in loose depth and each layer of backfill shall be compacted thoroughly and evenly using approved types of mechanical equipment. Each pass of the equipment shall cover the entire area of each layer of backfill.
 3. In compacting and other operations, the Contractor shall conduct his operations in a manner to prevent damage to structures due to passage of heavy equipment over, or adjacent to, structures, and any damage thereto shall be made good by the Contractor at no additional expense to the Owner.
- E. After backfilling trenches and excavations, the Contractor shall maintain the surfaces of backfill areas in good condition so as to present a smooth surface at all times level with adjacent surfaces. Any subsequent settling over backfilled areas shall be repaired by the Contractor immediately, in a manner satisfactory to the Engineer, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.
- F. The finished subgrade of the fills and filled excavations upon which topsoil is to be placed, or pavements are to be constructed, shall not be disturbed by traffic of other operations and shall be maintained in a satisfactory condition until the finished courses are placed. The storage or stockpiling of materials on finished subgrade will not be permitted.
- G. Uniformly smooth grading of all areas to be graded, as indicated and as directed, including excavated and filled sections, embankments and adjacent transition areas, and all areas disturbed as a result of the Contractor's operations, shall be accomplished. The finished surfaces shall be reasonably smooth, compacted and free from surface irregularities.

3.4 COMPACTION

- A. **Compaction Requirements:** Mechanical compaction shall be done in 12-inch lifts. Lifts in greater depths may be allowed if a request is submitted in writing to the Engineer for approval. The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as

determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

Area	ASTM Density Degree of Compaction
Pavement base course	95%
Pavement subbase	95%
General fill below pavement subbase	95%
Trench backfill	
- below pavement	95%
- below landscaped areas	90%
- below structures	95%
Other areas	90%

B. Moisture Control:

1. Fill that is too wet for proper compaction shall be disced, harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.
2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

C. Unfavorable Conditions:

1. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
2. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

D. Compaction Control:

1. In-place density tests shall be made in accordance with ASTM D1556, D2922 or D2167 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a

decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. In-place density tests shall be made at the Contractor's expense by the geotechnical testing laboratory.

2. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing performed by him shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.
3. In-place density tests shall be performed as directed by the Engineer:

E. Compaction Methodology:

1. Vibratory mechanical compaction is the preferred method for compaction. Should jetting be proposed by the Contractor, its viability to achieve the required degree of compaction shall be proven on a test section of trench, prior to allowing its use on a widespread basis. Compaction testing shall be used to determine the effectiveness of the jetting operation. Jetting shall be accomplished using a rigid pipe, long enough to reach deep into the trench. Large volumes of water under high pressure, equivalent to that available from fire hydrants, are necessary for jetting. The Contractor is made aware that municipal water will probably not be available due to limited supply, especially during the warm weather months. The Contractor shall provide water for jetting operations at his own expense. Municipal water use, when available, shall be metered at the hydrant connection. Jetting locations shall be frequent enough to achieve required compaction. Compaction testing required if jetting is used for compaction.
2. In backfilling trenches, each layer of backfill material shall be moistened and compacted to a density at least equal to that of the surrounding undisturbed earth, and in such a manner as to permit the compaction of the filled trench or excavation with the adjoining earth to provide the required bearing value, so that paving of the excavated and disturbed areas, where required, can proceed immediately after backfilling is completed.

3.3 FINE GRADING

- A. Before surface or subbase is spread, the subgrade shall be shaped to a true surface conforming to the Drawings. All depressions and high spots shall be filled with suitable material or removed and such areas again compacted until the surface is smooth and properly compacted. A tolerance of 1/2-inch above or below the finished subgrade will be allowed provided that this 1/2-inch above or below grade is not maintained for a distance longer than 50 feet and that the required crown is maintained in the subgrade. Any portion which is not accessible to a roller shall be thoroughly compacted by other mechanical methods.

3.4 REUSE AND DISPOSAL OF SURPLUS EXCAVATED MATERIALS

- A. Reuse surplus acceptable excavated materials for backfill. Legally handle, transport, and dispose of off-site excess excavated material. All as directed or permitted and without additional compensation.

END OF SECTION

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SECTION 02444
CHAIN-LINK FENCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Providing chain-link fence, gates and accessories as indicated and specified. New fencing shall match existing type, size, and material.
 - 2. Design Criteria:
 - a. Fence heights as indicated with top rail and bottom tension wire.
 - b. Gates to have openings with sizes as shown on the civil drawings.

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Submit manufacturer's specifications, drawings, details and fence layout with appurtenances.
 - 2. Submit certified test reports with results of tests for fence finish.
 - 3. Submit shop drawings, samples and certificates simultaneously as one complete package.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Galvanized steel.
- B. Steel pipe dimensions and weights: ASTM A53, Schedule 40. Dimensions specified are nominal pipe sizes.
- C. Dimensions and weight tolerances: Plus or minus five percent.
- D. Zinc Coating: Minimum 2.0 ounces per sq. ft.
- E. Provide posts with tops of same material, and designed to fit securely over post and carry top rail. Carry apron around outside of post at base of top fitting.
- F. Ferrous metal fittings, posts, fence, gate framework, and accessories galvanized with heavy coating of 2.0 oz. pure zinc spelter per sq. ft., use hot-dip process. Thinner zinc coatings, electro-galvanizing, zinc paint or cold galvanizing compounds shall not be used as substitute for hot-dipped galvanized finish.
- G. Fabricate and weld before hot-dip galvanizing. Weld conforming to American Welding Society standards.
- H. Hot-dip galvanized gate frame, after welding, if bolted or riveted corner fittings not used.
- I. Double leaf swing gates with latch, center bolt, center stop, and automatic backstops.

2.2 FENCE FABRIC

- A. Galvanized steel chain-link fabric conforming to ASTM A392, with Class 2 zinc coating (2.0 oz. of zinc per sq. ft. of uncoated wire surface); Fabric woven in 2-in. mesh from No.9 gage wire in an 8 ft. height.

2.3 TENSION WIRE

- A. No. 7-gage coil spring steel wire with galvanized finish having minimum of 0.80 oz. of zinc coating per sq. ft. of uncoated wire surface.

2.4 TIE WIRES

- A. Tie wires, for fastening fence fabric to line posts and rails, not less than No. 6 gage aluminum wire.
- B. Tie wires, for fastening fence fabric to line posts and rails, not less than 9 gage (outside diameter) galvanized steel wire.

2.5 LINE POSTS:

- A. 2-3/8 in. outside diameter steel pipe weighing not less than 3.65 lb. per ft., or 1-7/8 in. high carbon steel H-beams weighing not less than 2.70 lb. per ft.

2.6 END, CORNER, AND PULL POSTS

- A. 2-7/8 in. outside diameter steel pipe weighing not less than 5.79 lb. per ft., or 2-1/2 in. square steel tube weighing not less than 5.14 lb. per ft., or 3-1/2 in. by 3-1/2 roll-formed, steel corner section weighing not less than 5.14 lb. per ft.

2.7 GATE POSTS

- A. 6-in. outside diameter steel pipe gate posts for vehicular gate leaves 6 ft. wide or greater.

2.8 RAILINGS

- A. 1-5/8 in. outside diameter steel pipe with minimum weight of 2.27 lb. per ft. or 1-5/8 in. by 1-1/4 in., 14-gage roll-form section, for top railing and railings for top middle and bottom braces between terminal posts and adjacent line posts.

2.9 TRUSS

- A. 2-7/8 in. diameter steel rod diagonal truss braces between terminal and adjacent line posts and for gate framework.

2.10 FITTINGS

- A. Heavy-duty malleable iron or pressed steel fittings of suitable size to produce strong construction.

2.11 STRETCHER BARS

- A. Flat bars with minimum cross section dimensions of 1/4 in. by 3/4 in, full height of fabric, secured with bar bands of minimum 11-gage sheet steel, spaced approximately 15 in. on centers and bolted with 3/8 in. diameter bolts, for attaching fabric to terminal posts.

2.12 GATE LEAF FRAMEWORK

- A. 1-7/8 in. outside diameter steel pipe weighing 2.72 lb. per ft, minimum.

2.13 GATE HINGES

- A. Heavy pattern of adequate strength for gate size, with large bearing surfaces for clamping or bolting in position.

2.14 LATCH

- A. Gates with suitable latch, accessible from both sides and with provision for padlocking.

2.15 GATE PADLOCKS

- A. Manufacturers:
 - 1. Eaton Corp. Lock & Hardware Div., Yale Marketing Dept., Charlotte, NC;
 - 2. P&F Corbin, Div. of Emhart Corp., Berlin, CT;
 - 3. Best Universal Lock Co., Inc., Indianapolis, IN;
 - 4. Or acceptable equivalent product.
- B. Weatherproof solid brass cases, hardened steel shackles, removable core cylinders, and galvanized steel chains attached to shackle by a clevis.
- C. Provide (2) pad locks for each gate and (2) keys for each lock.

2.16 GATE KEEPER AND CATCH

- A. Furnish and install gate keeper and catch. Keeper and catch shall be galvanized steel.

2.17 CONCRETE FOOTINGS

- A. 3,000 PSI Class A concrete

2.18 GROUT

- A. One part Portland cement and three parts of clean, sharp, well-graded sand with minimum water for proper workability for posts set in solid rock.

PART 3 - EXECUTION

3.1 GENERAL

- A. Examine conditions under which fence and gates are to be installed. Notify Engineer, in writing, of improper conditions of work.

- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Verify measurements at site.
- D. Check location of underground work to make sure fence footings clear utilities and drainage work.
- E. Do not install fence until final grading is complete and finish elevations are established.

3.2 INSTALLATION

A. Footings:

- 1. Maintain vertical sides to minimize up-lift. Dispose of excavated material in accordance with Section 02210.
- 2. Rod and compact concrete around posts. Slope top of footings above level of adjacent grade, and trowel finish.
- 3. Size:
 - a. 12 in. minimum dia, plus outside dimension of post.
 - b. Set corner, end, pull, and gate posts 42 in. into concrete.
 - c. Set line posts set 36 in. into concrete.
 - d. Total depth of concrete 6 in. greater than required for post embedment.
- 4. Time of Set: 48-hrs before rails are erected or before fabric is applied or stretched.

B. Framing:

- 1. Install line posts not more than 10 ft. apart.
- 2. Install pull posts not more than 600 ft. apart where a straight run of fence exceeds 600 ft. and where fence line changes direction by more than 15° but less than 30°.
- 3. Install corner posts where the fence line changes direction by more than 30°.
- 4. Set posts in concrete footings, plumb and true to line.

5. Brace and truss end, pull, corner, and gate posts to adjacent line posts. Provide brace to match top rail spaced midway between top rail and tension wire and extending to adjacent line posts. Provide brace to match top rail spaced midway between top rail and tension wire and extending to adjacent line post. Truss diagonally with 5/16 in. dia tension rod with turnbuckle.
6. Fasten top rail to end, pull, gate and corner posts. Pass top rail through fittings of line posts.
7. Provide expansion and contraction joints in top rail for each 100 linear ft. of fence.
8. Fasten bottom tension wire to end, pull, gate, corner, and line posts.
9. Maximum area of unbraced fence shall not exceed 1500 square feet.
10. Use galvanized sleeve and grout posts or install with suitable galvanized flange casings and galvanized anchor bolts as directed by Engineer.
11. When rock is encountered, set posts into rock a minimum depth of 12 in. for line posts and 18 in. for terminal posts. If solid ledge is encountered without overburden of soil. Provide post holes at least 1 in. greater in diameter than post, fill post holes with concrete work post into hole taking care not to cause voids, remove excess concrete and crown remainder at top to shed water. Where solid rock is covered by overburden, do not exceed total setting depth required for setting in earth, grout posts into rock as described.

C. Fabric:

1. Place fabric on outside of posts and stretch to avoid bulging or buckling.
2. Fasten at line posts, top rail, and bottom tension wire with aluminum ties. Space ties not more than 15 in. apart on line posts and not more than 24 in. apart on rail and tension wire.
3. Fasten at terminal posts at intervals not exceeding 15 in. using flat or beveled galvanized steel bands with 5/16 in. x 1-1/4 in. galvanized carriage bolts and nuts.
4. Make tie connections on interior side of fence.
5. Provide steel angle metal closures where finished ground surface is more than two inches below bottom tension wire. Bolt steel angle to

fence posts, and install reinforcing rods and bracing members as approved. Install rods of accepted length vertically where drainage ditches cross fence line, provide concrete ditch lining and steel reinforcing bar grill.

D. Gates:

1. Install gates plumb, level, and secure for full width of opening and hardware adjusted for smooth operation.
2. Gates to be installed so that they open outward from the tank site.

E. Electrical Ground

1. Where a power line carrying more than 600 volts passes over fence, install a ground rod at nearest point directly below each point of crossing. Ground rod shall be in accordance with applicable Massachusetts Electrical Code requirements.

3.3 TOUCH-UP AND REPAIR WORK

- A. Remove and replace fencing which is improperly located or is not true to line, grade and plumb within tolerances as indicated.
- B. Connect to existing fence as indicated on the Drawings.

3.4 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02480

LANDSCAPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Providing loam, fertilizer, seed, trees, shrubs, plants, pruning, maintenance, and related work as indicated and specified.

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Submit with seed, certificates concerning seed mixture, purity, germinating value, and crop year identification.
 - 2. For trees, provide written description of proposed species and vendor.

1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. General:
 - 1. Furnish suitable quantities of water, hose and appurtenances.
 - 2. Use loam, having prior vegetative growth that did not contain toxic amounts of either acid or alkaline elements.
 - 3. Within the bordering vegetated wetland, reuse native soils.
 - 4. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.
 - 5. Repair or replace seeded areas, plants, shrubs, and trees which, in judgment of Engineer, have not survived and grown in a satisfactory manner, for a period of one year after acceptance.

6. Repair or replace seeded areas, plants, shrubs, and trees which, in judgment of Engineer, have not survived and grown in a satisfactory manner, for a period of one year after acceptance.
7. Replacement of trees shall be done in compliance with the Town of Wilmington Tree Removal Policy and the Order of Conditions issued by the Wilmington Conservation Commission, provided in Appendix B. Planting locations shown on the drawings are approximate. Final locations shall be approved by the Engineer and the Conservation Agent.
8. Dry loam test samples to constant weight at temperature of 230 deg. F, plus or minus 9 degrees.
9. The Engineer reserves the right to test and reject any material not meeting specifications by utilizing tests in accordance with methods adopted by the Association of Official Agricultural Chemists. Costs for these tests shall be paid by the Contractor.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610 and as specified.
- B. Delivery:
 1. Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law.

1.6 JOB CONDITIONS

- A. It is the intent of this specification that existing trees within work limits, not disturbed by building or landscaping operations, be saved and protected, except where specified to be removed. Clear trees required to be removed only after approval by Engineer.
- B. Planting Seasons:
 1. Recommended Spring Planting Season: From time soil can be satisfactorily worked until following dates at end of planting season:
 - a. Trees and shrubs –May 15
 - b. Evergreens - May 1
 2. Recommended Fall Planting Season: Commence and terminate at time listed below:
 - a. Trees and shrubs – From dormancy to November 30

- C. Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.
- D. Protection:
 - 1. Protect seeded areas and trees against damage by trespass and other causes.
 - 2. Protect work until accepted.
 - 3. Replace, repair, or replant as directed by Engineer, and at own expense, seeding or plantings which are damaged.
- E. Wherever landscape work must be executed in conjunction with construction of other work, arrange a schedule of procedure that will permit execution of landscape work as specified.

1.7 WARRANTY

- A. Guarantee lawn areas for duration of one full year after seeding to be alive and in satisfactory growth at end of guarantee period.
 - 1. For purpose of establishing an acceptable standard, scattered bare spots, none of which is larger than 1 sq. ft. will be allowed up to a maximum of 3% of lawn area.
- B. Guarantee planted trees for a duration of one full year after planting to be alive and in satisfactory growth at the end of guarantee period.

PART 2 - PRODUCTS

2.1 TREES

- A. Trees shall be Red Maple (*Acer Rubrum*) and Grey Birch (*Betula Populifolia*) of at least 1" caliper or other native deciduous shade trees approved by the Wilmington Conservation Commission.
- B. Shrubs shall be Sweetfern (*Comptonia Peregrina*) or Bayberry (*Myrica Pennsylvancia*) in 1-gallon containers or other native shrubs approved by the Wilmington Conservation Commission.

2.2 BONE MEAL

- A. Commercial raw bone meal, finely ground and containing a minimum of 1 percent nitrogen and 18 percent phosphoric acid.

2.3 STAKES

- A. Wood stakes, minimum of 2-in. by 2-in. square and 8 feet in length, of uniform size, straight, reasonably free from knots, treated with wood preservative and painted green.

2.4 WIRE

- A. Two strands No. 14-gage galvanized soft ferrous wire, twisted, for tree guying.

2.5 HOSE COLLAR

- A. Good quality reinforced rubber hose of minimum 1/2-in. inside diameter and green in color, for protecting tree bark from supporting wires.

2.6 TREE WRAP

- A. Quality, heavy, waterproof crepe paper manufactured for this purpose. Width of material not less than 6 inches, and wrapped from bottom with minimum 2 in. overlap.

2.7 ANTIDESICCANT

- A. Acceptable antidesiccant emulsion which provides a film over plant surfaces permeable enough to permit transpiration.
- B. Applied to evergreen trees, shrubs and all deciduous plant material. Application made prior to transportation from nursery if deciduous trees are leafed out at time of digging. The rate and method of application shall be in accordance with the manufacturer's recommendations.

2.8 EROSION CONTROL MAT

- A. 1/4-in. to 1/2-in. thick mat consisting of lime or silicate glass fibers with average fiber diameter to 9 microns and 2-in. to 4-in. strands of fiber bonded with phenol formaldehyde resin, 100 percent textile glass fiber, roll type, water permeable with a minimum thickness of 1/4-in., a maximum thickness of 1/2-in. and a density of not less than 3 pounds per cubic foot.

2.9 PEAT MOSS

- A. Shredded, loose, substantially free of mineral and waste matters.
- B. Minimum organic matter by weight on a dry basis: 80 percent.

2.10 LOAM

- A. Fertile, friable, natural topsoil typical of locality, without admixture of subsoil, refuse or other foreign materials, and obtained from well-drained arable site. Free of stumps, roots, heavy or stiff clay, stones larger than 1 inch in diameter, lumps, coarse sand, noxious weeds, invasive species, 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.

2.11 LIME, FERTILIZER AND SEED

- A. Ground agricultural limestone containing not less than 85 percent of total carbonates.
- B. Commercial type fertilizer, uniform in composition, free flowing, conforming to state and federal laws, and at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight: Nitrogen 10 percent, Phosphorus 10 percent, Potash 10 percent.
- C. Grass seed, in lawn areas located within the pump station fence, 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%
Merio Kentucky bluegrass	20%	87%	85%
Red Chewings Fescue	45%	98%	85%
Manhattan Rye	15%	98%	90%

- C. Grass seed for areas adjacent to or within wetland boundaries for erosion control, planting areas and restoration in moist sites shall be clean, high in germinating value and of the latest year's crop mix. Mix shall be New England Erosion Control/Restoration Mix for Dry Sites, or approved equal.
- D. All seed shall be certified free of invasive species and weeds shall not exceed 0.25 percent.

2.12 CRUSHED STONE

- A. Crushed stone made from light colored granite. Stone screened to insure uniformity of size. No flat, elongated stone used. Size of stone in mowing strips and other areas as indicated on drawings, conforming to following requirements:

Size of square screen	Percent passing
1-1/4 inch	95% minimum

PART 3 - EXECUTION

3.1 PLANTING PITS

- A. Excavate as a shallow bowl in accordance with following requirements:
 - 1. Excavate tree pits to minimum diameter of twice the rootball diameter, and sufficiently deep to allow root ball to be buried with only root flare slightly exposed above grade when root ball is sitting on undisturbed bottom of pit.
 - 2. Plant shrubs in pits 12 inches greater in width than diameter of root ball or container and sufficiently deep to maintain original level of soil relative to plant as grown in nursery.
- B. Set plants in center of pits, plumb and straight and at level that top of root ball is 1 inch lower than surrounding finished grade after settlement.
- C. Compact topsoil mixture thoroughly around base of root ball to fill all voids, when plant material is set. Cut all burlap and lacing and remove from top 1/2 of root ball. Backfill tree and shrub pits halfway with planting soil mixture and thoroughly puddle before backfilling tree or shrub pit. Water tree or shrub, again, when each backfill operation is complete.

3.2 PLANTING SOIL MIXTURE

- A. Thoroughly mix all loam used in backfilling planting pits, with peat moss at rate of 2 parts loam to 1 part peat moss, to obtain required planting soil mixture.

3.3 BONE MEAL

- A. Add bone meal to planting mixture used for backfilling tree and shrub pits in following amounts:

	Quantity (lb)	Plant Size
Shrubs*	3/5	all
Minor trees	1	3'-4' hgt.
	1-1/2	4'-5' hgt.
	2	5'-6' hgt.
	3	6'-8' hgt.
	5	8'-10' hgt.
Major trees	7	10'-12' hgt.
	5	2-1/2" to 3" cal.
	7	3"-4-1/2" cal.

* Do not apply bone meal to rhododendrons and azaleas.

3.4 PLANTING

- A. Thoroughly compact topsoil planting mixture around root balls and water. Immediately after plant pit is backfilled, form a shallow saucer slightly larger than pit with ridge of soil to facilitate and contain watering. After planting, cultivate soil in all shrub beds between shrub pits. Grub out sod or other growth and remove from bed area. Rake bed area smooth and neat and outline. Mulch all tree pits and shrub beds with a minimum of 3 inches of shredded pine bark mulch as indicated on drawings. Do not use admixture of wood chips in mulch.

3.5 SECURING AND PROTECTING

- A. Install tree guying and staking as indicated in details. All trees planted in Fall season shall be staked. For Spring planting, only trees that are unstable or weak shall be staked. Staking should be installed immediately if tree begins to lean or remains unstable during warranty period.
- B. Install hose collars for protecting tree bark.

3.6 PRUNING

- A. Prune each tree and shrub as necessary to perform the work of the project in accordance with American Association of Nurserymen standards to preserve natural form and character of plant.
- B. Remove all dead wood, suckers and broken or badly bruised branches only. Do all pruning with clean, sharp tools by workmen thoroughly familiar with this type of work. Cover all exposed cambium, as well as other exposed living tissue, with paint. Do not remove leaders. Where possible, prune only on dry days with temperatures below 40°F.
- C. Apply antidesiccant to all evergreen trees and shrubs and to all deciduous plant materials which are leafed out at time of planting. Follow manufacturer's recommendations regarding rate and method of application.

3.7 LOAM

- A. Spread loam on areas to be seeded, to required depth indicated on Contract Drawings or as directed by Engineer, fine grade and compact. Specified depth shall be that after compaction.

3.8 LIME, FERTILIZER AND SEEDING

- A. Apply lime by mechanical means at rate of 50 pounds per 1,000 sq. ft., or as soil analysis recommends.

- B. Apply fertilizer at rate of 50 pounds per 1,000 sq. ft., or as soil analysis recommends.
- 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 4 pounds per 1,000 sq. ft. on calm day, by mechanical means. 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.

3.9 CLEAN-UP

- A. Remove soil or similar material which has been brought onto paved areas, keeping these areas clean.
- B. Upon completion of planting, remove excess soil, stones and debris which has not previously been cleaned up and legally dispose of off-site.
- C. Prepare lawns and planting areas for final inspection.
- D. Protect slopes and embankments against erosion until work is accepted. Repair eroded portions of seeded or sodded areas by refilling, resodding, remulching and reseeding as required by condition and to satisfaction of Engineer. Protection may be by installation of sod strips or other methods.

3.10 MAINTENANCE - SEEDED AREAS AND PLANTING

- A. Maintain lawn planting areas at a maximum height of 2-1/2 inches by mowing at least 3 times. Weed thoroughly once and maintained until time of final acceptance. Reseed 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 planting and continue until final acceptance of work. Water, mulch, weed, prune, spray, fertilize, cultivate and otherwise maintain and protect all plants.
- C. Reset settled plants to proper grade and position, and restore planting saucers and remove dead material. Tighten and repair guys. Correct defective work as soon as possible within guarantee period.

3.14 INSPECTION FOR ACCEPTANCE

- A. Upon written request by the Contractor, the Engineer shall inspect the planting area to determine completion of contract work. This request must be submitted at least 10 days prior to the anticipated date. The planting area will become acceptable if the grass, seed mixtures shows a uniform, thick, and well-developed growth. When acceptance is made in writing to the Contractor, the Contractor's responsibility for maintenance shall terminate.
- B. The Contractor shall furnish to the Owner complete written instructions for maintenance of all lawn areas at time of acceptance.
- C. Acceptance of the planting area shall not occur before acceptance of the entire facility.

3.15 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

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SECTION 02615

EXTERIOR DUCTILE-IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Furnishing and installing exterior ductile-iron pipe and fittings, as indicated and specified.
- B. Options:
 - 1. For joints in buried exterior pipelines, provide push-on joint. All fittings and valves shall be mechanical joint. All joints shall be restrained.
- C. Related sections include the following:
 - 1. Section 01063 – Miscellaneous Requirements
 - 2. Section 02210 – Earthwork
 - 3. Section 02640 – Valves and Appurtenances
 - 4. Section 02675 – Disinfection of Water Mains
 - 5. Section 02704 – Pipeline Pressure and Leakage Testing

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Submit shop drawings or descriptive literature, or both, showing dimensions, joint and other details for each type and class of pipe, fitting and restraint system to be furnished for the project. All materials furnished under the Contract shall be manufactured in accordance with the Specifications and the specified standards. Submittals shall include

material information, dimensions, pipe class information, weights, gasket material data, coating and lining system data.

2. For North American pipe and fittings, submit manufacturer's literature stating that the ductile iron pipe and fittings have been manufactured and tested in accordance with AWWA/ANSI specifications.
3. Submit information on country of manufacturer for various items as specified. Fittings manufactured in countries other than United States or Canada shall require the following certifications:
 - a. Epoxy coating – Affidavit or Certificate of Compliance stating the coating conforms to all applicable requirements of AWWA C116 and that all inspections have been conducted and met per Section 4.4 and 5 of AWWA C116.
 - b. Cement Coating/Lining – Affidavit or Certificates of Compliance that the sand and seal coat material tests and inspections as required by AWWA C104 have been conducted and the results are in full compliance with the standards.
 - c. Fittings – Fittings shall have Affidavits of Conformance-Sworn Statements that all tests and inspections as required by AWWA C153 have been conducted and the results are in full compliance with the standards.
 - d. Certified copy of test data shall accompany the affidavits of compliance.

1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Owner reserves right to inspect and test by independent service at manufacturer's plant or elsewhere at his own expense.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610.

PART 2 - PRODUCTS

2.1 PIPE

- A. Ductile Iron:
 1. Exterior ductile iron pipe shall be that of a United States manufacturer who can demonstrate at least 5 years of successful experience in manufacturing ductile iron pipe. The pipe shall be equipped with push-

on joints.

2. All exterior ductile iron pipe shall conform to ANSI A21.50 (1976) (AWWA C150) and ANSI A21.51 (AWWA C151).
3. The ductile iron pipe 4-inch diameter and larger shall be Thickness Class 52. All pipe shall be furnished in nominal 18-foot minimum lengths, with Push-on Joints as manufactured by U.S. Pipe and Foundry Company, Griffin Pipe Co., Clow Corporation, or equal with gaskets conforming to AWWA C111 ANSI A21.11 "Rubber Gasket Joints".
4. The ductile iron pipe shall be double cement lined inside and then asphalt seal coated on the outside and inside approximately 1 mil. thick. The cement lining shall conform to AWWA C104 ANSI A21.4. The pipe shall be furnished along with necessary materials and equipment recommended by the manufacturer for use in joining pipe lengths and fittings.

2.2 FITTINGS

- A. Exterior fittings shall be manufactured in the United States and shall be compact ductile iron Class 350 Mechanical Joint, conforming to ANSI Specification A21.53 (AWWA C153), latest edition, for pipe sizes 16-inches and smaller, and Class 350 standard Mechanical Joint fittings conforming to AWWA C110/ANSI A21.10, latest edition except as specified, for pipe sizes 16 through 24-inches, unless specifically stated otherwise in the specifications or on the drawings. Fittings shall be suitable for use with restraints as specified hereinafter. Fittings shall be bituminous coated on the exterior and cement lined, seal coated on the interior or have a 10-mil factory applied epoxy coating on all interior and exterior surfaces. Epoxy coating systems shall be suitable for potable water and NSF 61 certified. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings and the number of degrees or fraction of the circle on all bends.
 1. Caps and plugs installed in all new work as indicated on the drawings shall be provided with a threaded corporation or bleeder valve so that air and water pressure can be relieved prior to future connection.
 2. Solid sleeves shall be ductile iron with 350 psi rating. Sleeves shall conform to ANSI/AWWA C110.

2.3 JOINTS

- A. Provide mechanical joint or push-on joint pipe with necessary accessories, conforming to ANSI A21.11.
 - 1. Provide gasket composition suitable for exposure to liquid within pipe.
 - 2. Provide gasket composition suitable for exposure to potable water.
- B. Provide pipe flanges and accessories conforming to ANSI A21.15.
 - 1. Provide flat faced flanges.
 - 2. Provide 1/8 in. thick, full faced gaskets suitable for exposure to liquid within pipe.
- C. Restrained joints shall be furnished for installation on all exterior joints including fittings, sleeves, hydrants, valves and pipe joints. Restraints for mechanical joints shall be Megalug Series 1100 as manufactured by Ebaa Iron Co., MJ Field Lok Gasket as manufactured by U.S. Pipe, Series 1400 Mechanical Joint Restraint as manufactured by Uni-Flange or equal. Restraints for push-on joints shall be Series 1700 as manufactured by Ebaa Iron Co., or Series 1390 as manufactured by Uni-Flange.
- D. Restraint systems for push-on pipe utilizing steel-wedge gaskets having a pressure rating of 350 psi will be acceptable.

2.4 COUPLINGS

- A. Pressure rating at least equal to that of related pipeline with a minimum rating of 150 psi.
- B. Ductile iron coupling with SBR gaskets and fusion bonded epoxy coating. Coupling shall be suited for extended range of pipe materials and diameters. Coupling shall be XR501 as manufactured by Romac Industries or equal by Dresser or Rockwell. Couplings shall be manufactured in the United States.

2.5 CONNECTIONS - TAPPED

- A. Provide watertight joint with adequate strength against pullout. Use only tapered thread taps.
- B. Maximum size of taps in pipe or fittings without bosses not to exceed that listed in appropriate table of Appendix to ANSI A21.51 based on:
 - 1. 2 full threads for ductile iron.

- C. Where size of connection exceeds that given above for pipe, provide boss on pipe barrel or use tapping saddle. Make tap in flat part of intersection of run and branch of tee or cross, or connect by means of tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, as indicated or permitted.

2.6 COATING PIPE WITHIN STRUCTURES

- A. Outside of pipe and non-epoxy coated fittings within structures: Clean and apply one coat of Koppers Pug Primer made by Koppers Co., Inc., Pittsburgh, PA; Chem-Prime 37-77 made by Tnemec Co., North Kansas City, MD; 13-R-50 Chromax Primer made by Valspar Corp. Short Hills, NJ; or acceptable equivalent.

2.7 POLYETHYLENE PIPE ENCASEMENT

- A. Material: Virgin polyethylene conforming to ANSI/ASTM D1248.
- B. Thickness: Minimum nominal thickness of 8 mils.
- C. Material and installation methods to conform to requirements of AWWA C105.

2.8 INSULATION

- A. Insulation for buried pipe shall be manufactured by Thermal Pipe Systems, Braintree, Massachusetts, Atlas Insulation, Ayer, Massachusetts or Insulated Piping Systems, Inc., Canton, Massachusetts, Urecon Ltd., distributed by Gemsco, Inc. of East Hartford, Connecticut, or equal. Insulation shall be factory formed-in-place polyurethane foam insulation having nominal thickness of 3", with an in-place density of 2.5 pcf, and a "K" factor of 0.14 BUT/in./hr/deg./F/sq. ft.
- B. Insulation shall be covered with PVC jackets. Straight joints between insulated pipe lengths and non-insulated pipe shall be PVC.

PART 3 - EXECUTION

3.1 HANDLING PIPE

- A. The Contractor shall take care not to damage pipe by impact, bending, compression, or abrasion during handling, and installation. Joint ends of pipe especially shall be kept clean.
- B. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.
- C. Only nylon-protected slings shall be used for handling the pipe. No hooks or bare cables will be permitted.

- D. Gaskets shall be shipped in cartons and stored in a clean area, away from grease, oil, heat, direct sunlight and ozone producing electric motors.

3.2 ALIGNMENT AND PLACEMENT OF PIPE

- A. Jointing of ductile iron pipe and fittings shall be done in accordance with the printed recommendations of the manufacturer and as specified. The last 8-inches of the outside of the spigot end of pipe and the inside of the bell end of pipe shall be thoroughly cleaned. The joint surfaces and the gasket shall be painted with a lubricant just prior to making up the joint. The spigot end shall then be gently pushed home into the bell. The position of the gasket shall be checked to insure that the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint.
- B. Installation and jointing of push-on ductile iron pipe shall be in accordance with AWWA C600 Sections 9b and 9c, latest revision, as applicable.
- C. Mechanical joints shall be installed with Mega-Lug, MJ Field Lok Gasket, or Uni-Flange restraints. Restraints shall be installed in full accordance with the manufacturers instructions. All bolt heads on Mega-Lugs or Uni-Flanges shall be tightened sufficiently so that they shear off to provide indication that proper tightening torque was achieved.
- D. Restrained push on joints shall be installed with specified joint restraints. Restraints shall be installed in full accordance with the manufacturers' instructions.
- E. Ductile iron pipe installed near cathodically protected gas lines or within areas subject to corrosive soils or waters shall be fully encased with polyethylene material.
- F. Insulated pipe with jacket is to be installed where shown on the drawings and on any pipe having less than 4-foot cover.
- G. Solid sleeves shall be used to join plain ends on ductile iron pipe. Mechanical joints shall be installed with Mega-Lug or Uni-flange restraints, as specified hereinbefore.
- H. Install "Buried Pipe" identification tape in all pipe trenches as specified in Section 01063.

3.3 INSTALLATION

- A. Piping Support:
 - 1. Furnish and install supports to hold piping at lines and grades indicated or specified.

2. Support pipe and appurtenances connected to equipment to prevent any strain imposed on equipment.

B. Pipe and Fittings:

1. Remove and replace defective pieces.
2. Clear off all debris and dirt before installing and keep clean until accepted.
3. Lay accurately to lines and grades indicated or required. Provide accurate alignment, both horizontally and vertically.
4. Provide firm bearing along entire length of buried pipelines.

C. Temporary Plugs: When pipe laying not in progress, close open ends of pipe with temporary watertight plugs. If water in trench, do not remove plug until danger of water entering pipe passed.

D. Appurtenances: Set valves, fittings and appurtenances as indicated.

3.4 JOINTS AND COUPLINGS

A. Push-on Joints:

1. Insert gasket into groove bell. Apply thin film of nontoxic gasket lubricant that is NSF 61 approved over inner surface of gasket in contact with spigot end.
2. Insert chamfered end into gasket. Force pipe past it until it seats against socket bottom.
3. Where required, install restraint and secure push-on joint restraint in accordance with manufacturer's instructions.

B. Mechanical Joints:

1. Wire brush surfaces in contact with gasket and clean gasket.
2. Lubricate gasket, bell, and spigot with soapy water.
3. Slip gland and gasket over spigot, and insert spigot into bell until seated.
4. Seat gasket and press gland firmly against gasket.

5. After bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint by torque wrench. Torque bolts to values specified above.

C. Sleeve-Type Coupling:

1. Clean pipe ends for distance of 8 in.
2. Use soapy water as gasket lubricant.
3. Slip follower and gasket over each pipe to a distance of 6 in. from end and place middle ring on pipe end until centered over joint.
4. Insert other pipe end into middle ring and bring to proper position in relation to pipe laid.
5. Press gaskets and followers into middle ring flares.
6. After bolts inserted and nuts made fingertight, tighten diametrically opposite nuts by use of torque wrench.

3.5 TESTING

- A. Clean of all dirt, dust, oil, grease and other foreign material, before conducting pressure and leakage tests.
- B. Pressure and Leakage Tests. Refer to Section 02704 for requirements.

3.6 DISINFECTING AND FLUSHING

- A. Disinfect potable water lines using procedures and materials conforming to AWWA C651.
- B. Refer to Section 02675 for additional requirements.

3.7 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02647

CONNECTING TO EXISTING WATER MAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Connecting to existing mains.
- B. Related sections include the following:
 - 1. Section 02210 – Earthwork, Dewatering, and Shoring
 - 2. Section 02615 – Exterior Ductile Iron Pipe and Fittings

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES.
 - 1. Submit shop drawings and manufacturer literature for sleeves, valves, couplings and piping to be used in connecting to existing mains.

PART 2 - PRODUCTS

2.1 COUPLINGS - SLEEVES

- A. Couplings and sleeves shall be as specified in Section 02615.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: The Contractor shall verify field conditions by test pits or other methods prior to construction.

3.2 INSTALLATION

- A. The Contractor shall make all connections to the existing mains as indicated in the Contract Documents. Existing mains shall be flushed prior to connecting to them.
- B. The Contractor shall develop a program for the construction and putting into service of the new work subject to the approval of the Engineer. All work involving cutting into and connecting to the existing water mains shall be planned so as to interfere with operation of the existing facilities for the shortest possible time.
- C. The Contractor shall have all preparatory work done prior to making the connection and shall provide all labor, tools, material, and equipment required to do the work in one continuous operation.
- D. The Contractor shall have no claim for additional compensation, by reason of delay or inconvenience, for adapting his operations to the requirements of the Owner.
- E. Under no circumstances shall any customer be without water for a period of more than 4 hours without prior written approval of the Owner. Should it appear that any customer will be without water for more than 4 hours, the Contractor shall install temporary water service at no additional cost to the Owner.
- F. The Owner does not guarantee a tight shut-off for existing local community water valves. No damages shall be claimed by the Contractor for delays in dewatering pipelines nor shall any damages be claimed because of water leaking through closed valves after dewatering is completed. It shall be the responsibility of the Contractor to provide the means to dewater the excavation if required when making connections.
- G. The Contractor shall be responsible for the following restrictions on shutdown of water mains:
 - 1. Valves to be operated only by the water personnel.
 - 2. 24 hour advance notice for shutdown requests shall be given to the Superintendent.

3.3 APPLICATION:

A. Connections:

1. Connections to existing mains shall be performed after approved disinfection and pressure test results have been obtained for the new mains.
2. Connections shall be accomplished with fittings or, if possible, pipe deflection.
3. Attachment to existing mains shall be accomplished with restrained mechanical joint, long body solid sleeve.

3.4 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02660

WATER SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the following labor and materials:
 - 1. Provide new water services and sampling stations. Items to include corporation stops, caps, curb stops; pack joint connection kits, service tubing, service piping, and curb boxes, as shown on the drawings or as directed by the Engineer. In general, a service shall be brought from the water mains to the sampling station installed under this contract.
- B. Related sections include the following:
 - 1. Section 02210 – Earthwork, Dewatering, and Shoring
 - 2. Section 02615 – Exterior Ductile Iron Pipe

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:
 - 1. Submit manufacturer's technical product data or descriptive literature, or both, showing services, corporation stops, curb stops, fittings and other details for each type of service to be furnished for the project.
 - 2. For informational purposes only, submit manufacturer's written installation instructions.
 - 3. Submit manufacturer's certification that valve materials used for wetted surface metals in contact with potable water are lead free with lead level not exceeding 0.25% and that materials comply with the 2014 Safe Drinking Water Act Lead Reduction law and with NSF 372.

1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Manufacturer's Qualifications: Firms regularly engaged in manufacture of potable water services materials and products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

PART 2 - PRODUCTS

2.1 SERVICES

- A. Where indicated on the Drawings, all pipe for services 2-inches or smaller shall be copper, rigid Type K tubing and shall conform to the provisions of AWWA C901.

2.2 CORPORATIONS, CURB STOPS AND SADDLES

- A. Materials used for wetted surface metals in contact with potable water shall be lead free with lead level not exceeding 0.25%. Materials shall comply with the 2014 Safe Drinking Water Act Lead Reduction law and comply with NSF 372.
- B. The corporation stops shall meet the most recent revision of the AWWA standard "Threads for Underground Service Line Fittings" (AWWA C800). Corporation stops shall be Mueller 300, Model B25008N, designed for 175 psi test pressure and manufactured by Mueller Inc or approved equal. Stops to have full keyway and rigid liners.
- C. Curb stops shall be ¼ turn Mueller B25209N Mark II Oriseal or approved equal. Stops shall have integral checks and O-ring seal and shall open left.
- D. Curb stop boxes shall be manufactured in the United States and be cast iron Buffalo type with recessed lid with pentagon bolt, adjustable sliding type.
- E. Service saddles shall be Smith Blair 313 Double Strap or approved equal. Bodies shall be ductile iron and straps shall be electrogalvanized carbon steel. Units shall be complete with Buna N gaskets.

2.3 FITTINGS

- A. Unless otherwise approved, only compression type fittings manufactured by Mueller Inc., or equal, shall be used.
- B. Adapters required allowing connection to sampling station shall be provided.

2.2 SAMPLING STATION

- A. Sampling stations shall be enclosed in a lockable, non-removable aluminum box with hinged openings.
- B. When open, the station shall require no key for operation, and all water flow shall pass through an all stainless steel waterway.
- C. All working parts shall be of stainless steel construction and serviceable from above ground with no digging required.
- D. The sampling station shall have a stainless steel petcock located below the sampling bibb to allow for purging of water during cold weather.
- E. The sampling station shall be furnished with an evacuation pump made by the same manufacturer.
- F. Sampling stations shall be Eclipse No. #88 manufactured by Kupferle, or approved equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. Water services shall be installed as a "wet" tap. Exact locations of services shall be located in the field by the Engineer. All services shall be installed to a minimum depth of 4'-6" unless specifically shown or directed otherwise by the Engineer.
- B. Service taps shall be made between the 2 and 4 o'clock positions of the water main. Existing mains shall be cleaned to allow proper installation of service saddles.
- C. Water service trenches shall be excavated and backfilled in accordance with Section 02210 of this Specification and in conformance to the details. Services to be installed beneath paved roadways can be driven beneath the pavement utilizing a pneumatically driven device such as "Hole Hog", or equal.
- E. Each service shall be flushed thoroughly and the end closed with duct tape prior to backfilling.
- F. Connections shall be thoroughly flushed prior to connecting. Contractor shall flush each service line to prevent scale-debris from blocking the equipment inlets.
- G. Contractor shall provide adapters to allow for the transition from rigid copper service line tubing to PVC or PEX piping and fittings where required by the equipment.

3.2 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02671

PRODUCTION WELLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Contractor shall furnish all materials, labor, tools and equipment and shall perform all work required to construct and develop and test pump the following:

Three (3) 18-inch by 24-inch production wells, as directed by the Engineer. Expected yield for each well is anticipated to be approximately 300 gallons per minute (gpm). The well depths shall be approximately 45-feet below ground surface.
 - 2. Plumbness/Alignment Testing.
- B. Related sections include the following:
 - 1. Section 02672 - Pumping Test for Production Wells
 - 2. Section 02673 – Pitless Adapter
 - 3. Section 11210 – Submersible Pump
 - 4. Section 11215 – Well Level Control System
 - 5. Appendix A – Test Well Logs
 - 6. Appendix B – Order of Conditions

1.3 DESCRIPTION OF WORK

- A. The Contractor shall pay special attention to the proposed well location and access logistics in selecting equipment and the means and methods of construction. The Contractor shall furnish and install erosion control materials along limit of work in accordance with plans, and in compliance with all provisions of the Town of Wilmington Conservation Commission Order of

Conditions; make all excavations; furnish, place and remove telescoping casings as necessary; furnish and place the base, screen sections, and plain pipe sections of the inner casing; furnish wash if required, and place the filter-pack; furnish and place temporary gravel refill pipes for the wells as necessary; furnish all material for and mix and place the concrete sanitary seal and furnish and place a temporary watertight cap or seal over the inner casing of the wells. The Contractor shall also furnish, and place suitable temporary pipes for conveying the water pumped from the well during construction to such location remote from the well (up to 400 ft) as required by the Order of Conditions; furnish the necessary pumping equipment and all power required to operate the pump for such time as may be necessary to develop the well and for the period of testing; disinfect; and remove and dispose of all surplus material.

- B. The Contractor will furnish and install a pitless adapter-type wellhead in accordance with Section 02673.
- C. The well shall be constructed in accordance with applicable sections of ANSI/AWWA A100 and MassDEP Guidelines and Policies for Public Water Systems.
- D. The Contractor shall take precautions to prevent any leakage of oil or hazardous materials from construction or drilling equipment at the job site. These precautions include, but are not limited to, proper preventative maintenance of all equipment, placement of polyethylene sheeting beneath equipment, and providing absorbent spill pads and/or a Haz-Mat kit at the site.

1.4 SUBMITTALS

- A. As per section 01300 and as specified herein, the Contractor shall submit to the Engineer copies of soil stratum data for each production well. Data shall include well logs showing stratum, depths, water table elevations, screen data and intervals.
- B. Representative soil samples of each stratum of different material encountered shall be submitted to the Engineer. Each sample shall be a minimum of one pound dry weight in a suitable container with a label indicating well number and depth below ground surface at which the sample was taken.
- C. In areas where the screen is to be set, the Contractor shall submit sieve analysis for stratum at three (3) foot intervals from a depth of 25 feet below ground surface to the bottom of the well, and at the bottom of the borehole. Sieve analysis to be based on 0.5 cubic foot minimum soil samples of each stratum. Sieve analysis results, including grain size distribution plots, shall be provided to the Engineer within 5 working days of collection.
- D. Filter-pack and screen slot size and length recommendations based on the sieve analysis shall be submitted to the Engineer for review. Slot size and screen length shall limit maximum screen entrance velocity to 0.1 feet per second or less.

- E. Screen construction specification data sheets from the manufacturer showing material and method of construction, diameter, length, open area, collapse strength, tensile strength, and slot size shall be submitted to the Engineer prior to installation.
- F. Manufacturer data for glass bead filter pack and gravel filter pack and attestation that products conform to specifications herein.
- G. As-built drawing of production wells showing casing sizes, depths, screen sizes, water levels and other pertinent information shall be submitted upon completion of the work.
- H. Copies of well plumbness/ alignment test results shall be submitted by the Contractor to the Engineer within five (5) days of performing said tests.
- I. Contractor shall submit qualifications of well driller for approval. The proposed well driller shall hold a Massachusetts Drilling License and have a minimum of 15 years of experience installing municipal drinking water wells.

PART 2 - PRODUCTS

2.1 PRODUCTION WELLS

- A. The Contractor shall be responsible for constructing the production wells to meet the design and performance requirements herein. Each well shall consist; in general, of the following major items:
 - 1. All required temporary outer casings. Contractor to determine appropriate casing size based on well diameters. Temporary casing information to be provided to Engineer prior to construction. At a minimum this shall consist of a 24" diameter temporary outer casing.
 - 2. A permanent inner type 304 stainless steel casing of 18-inches inside diameter and of length to reach from the cutoff height, hereinafter specified, to the top of the well screen. The inner casing shall extend 2.5-feet above finished grade prior to installation of pitless adapter.
 - 3. A type 304 stainless steel well screen, approximately 10-feet in length (final length to be determined following sieve analyses), which shall be an extension of the bottom section of the permanent inner casing and shall extend to the bottom of the well.
 - 4. A Type 304 stainless steel bottom plate of 3/8-inch thickness and 22-inches in diameter shall be welded to the bottom of the well screen in such a manner as to ensure that the well screen is centered on the plate to within 1/16th-inch.

5. An envelope of filter-pack consisting of glass beads followed by graded gravel between the 18-inch and 24-inch casings.
6. Concrete sanitary seal shall fill the void between the 24-inch and 18-inch casings above the filter-pack.
7. A pitless adaptor shall be installed as specified in Section 02673

2.2 WELL SCREEN AND INNER CASINGS

- A. The well screen shall be 18-inch diameter pipe size Type 304 stainless steel, continuous-slot type well screen. Each screen shall be constructed by winding cold-drawing wire approximately triangular in cross section, spirally around a circular array of longitudinal rods or bars. The wire shall be welded to each longitudinal rod or bar. Screen data shall be reviewed by the Engineer. Screen shall be furnished by Johnson Screens, New Brighton, Minnesota, USA; or equal.
- B. The screen shall have a length of screen surface and slot openings of appropriate sizes (or combinations thereof) as directed by the Engineer. Screen shall be sized to limit entrance velocity to a maximum of 0.1 feet per second.
- C. The bottom of the screen section shall be closed by a 3/8-inch thick by 22-inch diameter Type 304 stainless steel bottom plate, continuously welded to the bottom of the screen, and centered thereon, which shall serve as a bearing plate for the inner casing and screen. This bottom plate shall rest on a 1-foot thick gravel pack as shown on the plans.
- D. The plain pipe sections of the inner casing shall extend from the top of screen to 2.5-feet above ground surface and shall be of Type 304 stainless steel not less than 1/4-inch thick.
- E. The screen and plain pipe sections of the inner casing shall be fastened together by suitable couplings, by welding, or by such other method as may be acceptable to the Engineer. Materials for the riser shall be selected so as to minimize the occurrence of galvanic corrosion resulting from the proximity of dissimilar metals.

2.3 FILTER PACK MATERIALS

A. GLASS BEADS

1. Glass bead filter pack shall be placed from the bottom of the screen to 10-feet above the top of screen. Glass bead filter pack shall be manufactured using polished soda lime glass with the following composition:

- a. Silicon Dioxide (SiO₂): 65-75%
 - b. Sodium Dioxide (Na₂O): 12%-7%
 - c. Calcium Oxide (CaO): ≤ 11%
 - d. Aluminum Oxide (Al₂O₃): ≤ 5%
 - e. Magnesium Oxide (MgO): ≤ 5%
2. Glass bead filter-pack shall have a minimum mean roundness of 93% and a minimum hardness of 6 on the Mohs hardness scale. The deformation temperature shall be 580° F or greater.
 3. Contractor shall determine the appropriate glass bead size based on the sieve analysis and proposed screen slot size. The size shall be such that they are retained by the screen and limit entrance velocity to a maximum of 0.1 feet per second. The proposed size shall be submitted to the Engineer for approval.
 4. Glass beads shall be SiLibeads Water as manufactured by Sigmund Linder, Shu-Pak Glass Bead Filter Pack as manufactured by Johnson Screens, or approved equal.

B. GRAVEL

1. Gravel shall be placed from the top of the glass bead filter pack to the bottom of the sanitary seal. Gravel may be taken from river deposits, seashore, or banks of sandy material. Gravel screened from hardpan or clayey material shall be cleaned by careful washing. The gravel shall be hard durable, well-rounded stones washed free of dust or clay and of such composition that after immersion for 24 hours in concentrated, warm, hydrochloric acid, it shall not have lost more than 5 percent of its original dry weight. The gravel shall be well sorted between the sizes designated by the Engineer at the time of constructing the well and shall be screened to remove materials which are too large or too small.
2. Gravel of the different sizes shall be kept segregated with suitable partitions during transit and at all times before placing. Gravel sizes 1/4-inch or smaller in size shall be furnished by Northern Gravel Co., Muscatine, Iowa; or approved equal.

2.4 SANITARY SEAL

- A. A sanitary seal consisting of concrete grout shall be placed in the annulus between the 24-inch and 18-inch casings.

- B. The sanitary seal shall be placed from 7 feet below ground surface to a depth of 20 feet below the ground surface.
- C. The grout shall consist of equal parts of type II cement conforming to ASTM C150 and sand, with not more than 5 gallons of water per bag (1 ft³ or 94 lbs) of cement. The use of bentonite (up to 6 percent by weight of cement) may be approved by the Engineer. The water to be used shall be of potable quality.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavation for the outer casing shall be done with a well-drilling rig acceptable to the Engineer. The outer casing shall be driven ahead of the bottom of the excavation and no excavation shall be performed at any time below the cutting edge of the casing.
- B. The outer casings shall be driven plumb, and sufficient checks shall be made during driving to assure that it is plumb.
- C. The Contractor shall telescope the installation of temporary casings as required to keep skin friction to no more than 25-feet. Temporary casings of diameters different than those specified herein shall be provided by the Contractor at no additional cost to the Owner.
- D. The outer casings shall be driven plumb, and sufficient checks shall be made during driving to assure that it is plumb. Plumbness checks, performed in accordance with Section 3.6, shall be submitted to the Engineer prior to setting inner casing and well screen.
- E. Drill cuttings shall be collected for disposal at an off-site location acceptable to the Engineer.

3.2 PLACING INNER CASINGS

- A. The screen and inner casings shall be carefully lowered into the well, centered, and accurately plumbed, and braced in this position to ensure that it will not be displaced when the filter-pack is placed and to assure that the gravel envelopes shall be of uniform thickness at all points.

3.3 PLACING FILTER GRAVEL AND SANITARY SEAL

- A. Filter-pack materials shall be disinfected immediately prior to or during placement. Disinfection shall be by 12-percent hypochlorite solution. Filter-pack shall be tremied in place, in one continuous operation.
- B. Filter-pack of gradations to be determined by the Engineer shall be placed within the annular spaces between the 24-inch casing and the 18-inch casing. Filter-pack material shall be evenly distributed around the annular spaces

without segregation of the grain sizes. The outer casing shall be pulled up as the filter-pack is placed and the well is developed. Extreme care shall be used to keep the filter-pack at all times well above the bottom of the casings and refrain from doing anything that might throw the inner casing out of plumb.

- C. Above the top of the glass beads surrounding the screen, a minimum of 5 feet of finer gravel of proper graduation shall be placed between the sanitary seal and the coarser glass filter beads in the annular space between the 24-inch and 18-inch casings.
- D. Great care shall be taken not to disturb the inner casings when placing the gravel or concrete fill. It shall be the responsibility of the Contractor to maintain the inner casing in correct position and truly plumb at all times, and it shall be left so upon completion of the well.

3.4 SURFACE SEAL

- A. After completion of the well and its test pumping, and prior to installation of the pitless adapter, the top of the 18-inch casing shall be sealed with a watertight cap securely fastened in place or a steel plate welded watertight to the casing. At no time during construction of the well, shall casings be left open and unprotected.

3.5 DEVELOPING AND CLEARING WELLS

- A. The well shall be developed by simultaneously surging and pumping the water in the well or by other acceptable operations. Fine material removed from the surrounding soil by the developing operations shall be removed from the inner casing.
- B. The Contractor shall furnish and install a suitable temporary pump and a discharge pipe across the land adjoining the well to such location, where the water may be discharged without causing damage.
- C. The Contractor shall furnish power and labor and operate the pump at such rates of discharge until all fine sand that may be drawn into the well has been removed and the water is free from turbidity, as determined by the Engineer. Each well shall be developed for a minimum of 24-hours.
- D. Additional development time beyond 24-hours shall be approved by the Engineer. Additional filter-pack shall be placed in the well to make up for any settlement that occurs while the well is being cleared.

3.6 PLUMBNESS/ALIGNMENT TESTS

- A. Upon completion of well construction, the Contractor shall check the well for plumbness and alignment. The well shall be checked by lowering a cylindrical plummet into the well for the entire depth. Measurements for horizontal deflection of the plumb line and calculated drift shall be made at 10-foot

intervals. Testing shall comply with AWWA Standard A-100 except as specified hereinafter.

- B. The plummet shall consist of a rigid spindle with perforated round plates at each end. The outer diameter of the end plates shall be ½-inch smaller than the inside diameter of well casing. Distance between the plates, shall be approximately 1.25 times the inside diameter of casing. The plummet shall be heavy enough to keep the plumb line taut.
- C. The plummet shall be lowered into the well at a maximum of 10-foot intervals, and horizontal deflection of the plumb line from the center of top of casing shall be measured. Horizontal deflection shall be measured in two planes 90° from each other.
- D. Drift (horizontal deviation) of the casing at each depth recorded shall be calculated by using the following formula:

$$\text{drift} = \frac{\text{Deflection} \times (\text{height} + \text{depth})}{\text{height}}$$

where:

drift = calculated horizontal deviation of casing from the vertical (in inches)

deflection = measured horizontal deflection of the plumb line from the center of the top of casing (in inches)

height = height of apex above top of casing (in feet)

depth = depth of the plummet below the top of casing (in feet)

- E. Calculation of drift of the casing, based on the above formula, shall be prepared by the contractor and submitted to the Engineer for review.
- F. The maximum allowable horizontal deviation (drift) of the well from vertical shall not exceed 4-inches per 100-feet.
- G. The contractor shall insert a 40-foot long section of pipe into the well to verify alignment. The pipe shall not be more than ½-inch smaller than the casing diameter. The pipe shall move freely throughout the tested section.
- H. If the well exceeds the plumbness or alignment test allowances, the Owner may elect to withhold payment for work performed. Acceptance of the well will be based upon successful test results.
- I. A copy of plumbness and alignment data shall be furnished to the Engineer within five (5) days of completion of the tests. Data shall be submitted in a format as shown in AWWA Standard A-100.

J. The Engineer shall be present during the plumbness and alignment testing.

3.7 DISINFECTION

- A. The well shall be disinfected to remove bacteriological contamination. Disinfection shall be accordance with AWWA C654. All discharged water shall be dechlorinated.
- B. Chlorine solution shall be of a volume and strength and so applied so that a minimum concentration of 50 mg/L of available chlorine is obtained for the full water depth of the well. After the chlorine has been applied, the well shall be surged at least three times to improve the mixing and induce contact of the chlorinated water with the adjacent aquifer. The chlorinated water shall be allowed to rest in the casing for at least 12 hours but for no more than 24 hours.
- C. If samples taken after disinfection show bacteriological contamination, the Contractor shall prepare and apply a total volume of chlorine solution of at least 100 mg/L of available chlorine equal to four (4) times the volume of the well(including filter pack volume). This solution shall remain for a minimum period of 24-hours. Rechlorination and resampling shall be performed at no additional cost to the Owner.
- D. The well shall be pumped to remove chlorinated water. All discharge water shall be dechlorinated in accordance with AWWA C654. After the well has been pumped, two (2) bacteriological samples shall be collected and analyzed for bacteriological contamination. Bacteriological tests shall show zero (0) coliform. Failure to achieve the required results will require the Contractor to re-chlorinate and retest the well until satisfactory results are obtained and at no additional cost to the Owner.

3.7 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02672

PUMPING TEST FOR PRODUCTION WELLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. 2-hour performance pump test.
 - 2. 48- hour prolonged pumping test.
 - 3. Monitoring Pumping and Recovery levels.
 - 4. Analytical sampling.
- B. Related sections include the following:
 - 1. Section 02671 - Production Wells

1.3 DESCRIPTION OF WORK

- A. Furnish all materials, labor, tools and equipment to perform individual 2-hour pump tests on each well following development and a combined 48-hour pump test on the new wells.
- B. Contractor shall furnish the pumping equipment and power required to operate the pump for such time as is necessary for the periods of testing. Contractor shall furnish and install all required piping, valves and flow measurement devices.
- C. Contractor will supply generator and fuel for temporary power for the duration of all testing. Generator shall be of a variety of low noise generation.
- D. The Contractor shall be responsible for measuring well levels in both the production wells, observation wells and well points during the pumping and recovery phases of the test.
- E. The Contractor shall be responsible for collecting all samples and submitting

them to a MassDEP approved laboratory for analysis of the drinking water parameters listed herein.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:

1. Submit a description of the proposed pump test. Description shall include discharge pipe locations, flow meter type, pump equipment, power connection details, proposed pump rates and well level monitoring descriptions.
2. Upon completion of the pumping tests, submit a complete pumping log showing dates of pump test, production, observation and well point level readings during the test and recovery periods, and precipitation data for pump test period. Test data shall be typewritten and submitted in tabular format.
3. Contractor shall submit all field data and complete laboratory analyses results to the Engineer within 7 calendar days of completion of the performance test.
4. All other records and data indicated in Part 3 of this specification.

PART 2 – PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 2-HOUR PERFORMANCE PUMP TEST

- A. Contractor shall perform a 2-hour well performance test on each well immediately following the completion of well development activities. The Contractor shall record pumping rates, times and drawdown in the pumping well and the nearest monitoring well and provide written information in tabular format to Engineer. The distance between the pumped well and the nearest monitoring well shall be measured to the nearest 0.10-foot. Drawdown shall be recorded in the pumping well and the nearest monitoring well in accordance with the following schedule:

1. 0 minutes – 5 minutes: every 30 seconds
2. 6 minutes – 15 minutes: every 1 minute
3. 20 min – end of test: every 5 minutes

- A. The Contractor shall furnish power, tools, labor and equipment to pump the well at a rate of approximately 250 gallons per minute continuously during the pump test. If a rate of at least 250 gallons per minute is not achieved, the well will be developed for an additional period of time as directed by the Engineer. Contractor shall furnish and install all required piping, valves and flow measurement devices.

3.2 48-HOUR PROLONGED PUMP TEST

- A. Following the installation and 2-hour performance testing of each well, the Contractor shall perform a 48-hour test on the newly installed combined wellfield. The purpose of the performance test is to provide verification of pump design and verification of water quality for MassDEP. The pump test is to be performed in the manner generally described below.
 - 1. Contractor to test the complete wellfield at its design operating capacity of 700 gpm using the new submersible pumps installed in accordance with Section 11210.
 - 2. Contractor to furnish a plan and all equipment necessary to discharge water to waste in a manner deemed satisfactory to the Owner and the Wilmington Conservation Commission.
 - 3. During the performance of the pump test, Contractor shall record the individual and combined flow of water from the wellfield. Flow is to be recorded every 120 minutes beginning not more than five (5) minutes following the commencement of pumping.
 - 4. Drawdown measurements shall be collected in accordance with Paragraph 3.3.
 - 5. Water quality samples shall be collected from the combined water stream after a period of 48-hours of pumping to waste and prior to pump shut down. The Contractor is responsible for collecting samples and submitting them to a laboratory certified in Massachusetts for the following analyses:
 - a. Coliform bacteria
 - b. Nitrate/Nitrite
 - c. Arsenic
 - d. Volatile organic compounds by EPA 524.2
 - e. Per and Ployfluoroalkyl Substances via EPA Method 537 (14 Compounds) or 537.1(18 Compounds)
 - f. Secondary contaminants, as defined in Appendix A to the most recent edition of MassDEP's *Guidelines and Policies for Public Water Supplies*.

- D. The start of the test shall be scheduled so as to allow final sampling to take place on a non-weekend day.

3.3 PUMPING TEST RECORDS AND PROCEDURES FOR 48-HOUR PROLONGED PUMP TEST

- A. Records - Accurate records of the pumping rate, weather conditions, including rainfall measurement and drawdown of all production wells and observation wells, must be maintained during the pumping test and recovery periods.
- B. Pumping Rate - The pumping rates must be recorded at least every two hours. A flow metering device shall be provided which is capable of providing instantaneous flow measurements accurate to within $\pm 3\%$ of the pumping rate.
- C. Duration - The duration of the prolonged pumping test shall be a minimum of two consecutive days or as determined by the Engineer. The duration of the prolonged pump test shall be extended if stabilization is not achieved.
- D. The four observation wells to be monitored during the prolonged pump test are TW 3-20, TW 7-20, OW 6-20, and OW 2-19. Water level monitoring of the production wells is also required.
- E. The Contractor shall record well level drawdowns and recoveries of the production wells and observation wells at a minimum, as follows:
 - 1. The production wells (Well 9-AR, Well 9-BR and Well 9C) and primary observation wells listed above (3.3D) will be measured for drawdown levels according to the following schedule:

Static (within one hour prior to test start-up)
30 seconds
1, 1.5, 2, 3, 4, 5, 6, 7, 8, 9 minutes
10, 15, 20, 30, 40, 50, 60, 70, 80, 90 minutes
2, 3, 4, 5, 7, 9, 11, 13, 15, 18 hours
24 hours, then twice per day (maximum of 8 hours apart - e.g. 7 a.m. and 3 p.m.)
- F. Recovery readings at the observation and production wells will be taken on the same schedule as drawdown measurements, with the exception that the final pumping level (equivalent to the static water level during the pumping phase) will be measured within five minutes prior to shutdown. Recovery measurements will be taken for as many days as the wells were pumped, or until 95% recovery has been obtained, whichever occurs first.

3.4 STANDARDS OF MEASUREMENT

- A. All water level measurements shall be recorded to the nearest 1/4 inch, or 0.02

feet. Precipitation during the pumping and recovery periods shall be measured on site to the nearest one hundredth (0.01) of an inch. The pumping rate shall be recorded every two hours, and the measuring device shall be accurate to within plus or minus 3% of the pumping rate. Observation well elevations shall be surveyed to the nearest one-hundredths (0.01) of a foot.

- B. Stabilization - The production wells will be considered stabilized if the drawdown readings recorded at the wells or observation wells 2 feet away have not varied more than 0.5 inches during the final 24 hours of the prolonged pump test. The pumping rate must not vary during this final 24-hour period. No shutdowns are permitted during this period.

3.3 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02673

PITLESS ADAPTER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Furnishing and installing three (3) 20"- Pitless Adapters and accessories.
 - 2. Pump dimensional data presented herein is based upon field estimates from observation wells. After the well is fully developed, the Contractor shall submit well construction and yield data such as specific capacity to the Engineer. The data from the fully developed well shall be reevaluated, prior to furnishing and installing the pitless adapter.
- B. Dimensional information
- C. Color selection – upper barrel

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES:
 - 1. Shop Drawings: Include illustrations, dimensions, materials, performance and wiring diagrams.
 - a. Shop drawing data for accessory items
 - b. Manufacturer's literature as needed to supplement data.
 - 2. Field inspection reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Section 01610 Delivery, Storage & Handling.
- B. Store pumps and motors on site according to pump and motor manufacturer's

recommendations.

PART 2 - PRODUCTS

2.1 PITLESS ADAPTER

- A. Pitless adapter shall be lead-free, heavy-duty spool style, designed to carry the weight of the complete pump unit, with two BUNA N O-rings sealed against 304 stainless steel seats, for a submersible pump installation. The unit shall be coated with FDA/NSF approved catalytic epoxy paint. The exterior paint color shall be approved by the Engineer.
- B. Well casing diameter is 18-inches. Upper barrel shall have diameter 2 inches larger than lower barrel (20-inches). The upper barrel of the well casing shall extend 30-inches above ground elevation, as shown on the Drawings. Upper Barrel shall be Forest Green or color as approved by Engineer.
- C. Discharge pipe diameter is 6-inches. Discharge pipes shall be plain end type 304 stainless steel with a minimum bury depth of 5'0" to top of discharge pipe. Discharge pipe shall be 12-inches in length. The pump inlet line is 4" and shall be NPTM threaded.
- D. Well cap shall be watertight. Well cap shall be steel with a screened, down-turned vent. Well cap shall be provided with tappings for required electrical connections. Unit shall also be furnished with hydrant tapping/sample port, locking bolts, hold down ring, and torque arrestor and lift-out bail.
- E. Electrical junction boxes shall be weatherproof and appropriately sized to accommodate power and signal wiring for a 10 hp motor and level transducer cable. Contractor shall coordinate the size of junction boxes with pitless adapter manufacturer.

Pitless adapters shall be Model No. MB,HD,S-18,20,6,P-4,NPT-WT-6.5-HDH-LOB as manufactured by MAASS Midwest Mfg., or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The pitless adapter shall be installed according to manufacturer's printed recommendations.
- B. Contractor shall excavate and cut well casing as required to install pitless adaptor.

3.2 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02675

DISINFECTION OF WATER MAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Disinfection of pipelines.
- B. Related sections include the following:
 - 1. Section 02615 – Exterior Ductile Iron Pipe and Fittings.
 - 2. Section 02671 – Production Wells
 - 3. Section 02704 – Pipeline Pressure and Leakage Testing
 - 4. Appendix B – Order of Conditions

1.3 SYSTEM DESCRIPTION

- A. Disinfect all water main and appurtenances installed under this contract. Disinfection shall occur after successful leakage testing as specified in Section 02704 has been conducted.
- B. The location of raw water line and appurtenances are shown on the Drawings.
- C. Pipeline disinfection shall be performed in conjunction with the related work items of dewatering, testing, and discharge of chlorinated water, prior to placing newly installed water main in service. The Contractor's responsibility shall include, but not be limited to the following:
 - 1. Provision of the chlorine product for disinfection at the rate and dose specified shall be in accordance with AWWA standards.
 - 2. Provision of pipeline taps for dosing and testing of chlorinated water, as necessary.
 - 3. Labor and equipment necessary to dispense the dose chlorine at points

and rates as directed by the Engineer.

4. Labor and equipment to dechlorinate the treated water prior to discharge.
- D. The Contractor shall be responsible for disinfecting and putting into service new water mains which shall become the property of the Owner.
- E. Contractor shall be responsible for coordinating all activities with the Owner.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES:

1. Two weeks prior to initiating disinfection work, the Contractor shall submit to the Engineer a written workplan describing fully his proposed work. The workplan shall include, but not be limited to, the following:
 - a. Full description of method to be used (slug or continuous feed) in disinfecting the mains.
 - b. Method for filling and flushing water mains
 - c. Chlorine agent to be utilized.
 - d. Chlorine material safety data sheets.
 - e. Chlorine batching calculations to show required level of chlorine being added to the mains.
 - f. Flushing methods listing pipe diameter, length, flushing time calculations and location of flushing outlets.
 - g. Methods of measuring chlorine solution being added to the pipe and after it has been added.
 - h. Sample collection techniques.
 - i. Names of personnel who will be conducting the disinfecting and sampling.
 - j. Name of laboratory proposed to perform the tests.
 - k. Dechlorination methods, including dechlorination agent and discharge locations.
 - l. Backflow preventer data (model, size).
2. Engineer shall review the Contractor's workplan. Workplan shall be revised and resubmitted as required by the Engineer.
3. No disinfection work shall commence until Engineer approves the workplan.

1.5 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400.

1.6 PROJECT/SITE CONDITIONS

- A. Water for filling and flushing is available from the distribution system (hydrant connection). To utilize this water for the disinfection work as specified, contractor must coordinate location with the Owner.
- B. Delays caused by other contractor's failure to complete or provide suitable water for testing shall not be cause for additional costs to the Owner.
- C. All water shall be discharged in accordance with local, state and federal regulations. Refer to Appendix C for Order of Conditions.
- D. The Owner may elect to collect samples and deliver them to the laboratory. The Contractor shall coordinate work with the Owner and provide assistance as required.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate operation of existing valves, timing and duration of shut-down of existing mains, and disinfecting, and re-energizing of the water main with the Engineer and where applicable with the Owner including notification of the following prior to the stated work:
 - 1. Valve Operations: Notify Engineer one (1) working day prior to stated work.
 - a. The opening and closing of existing valves shall be performed by Town personnel only.
 - 2. Disinfecting and Flushing: Notify Engineer three (3) days prior to stated work.
 - 3. Notification shall include location of work, length and diameter of the pipe to be disinfected and other pertinent information.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Calcium hypochlorite shall conform to AWWA B300.
 - 1. Granules with 70 percent available chlorine.
- B. Liquid sodium hypochlorite shall conform to AWWA B300.
- C. Backflow preventer devices (reduced pressure devices), model to be State approved.

- D. Line purge dechlorinator with dechlorination tablets or other method acceptable to the Engineer. Dechlorinator shall have 2-1/2 inch NPT coupling and capacity flow rates of up to 1,600 GPM. Dechlorination tablets shall be ascorbic acid, sodium sulfite or sodium thiosulfate, capable of dechlorinating the flushed water. Dechlorinator shall be H₂O Neutralizer as manufactured by Measurement Technologies, Inc., Redmond, WA (860-651-3368), or Model LPD-250 as manufactured by J. Pollard Co., Hyde Park, NY.
- E. Chlorine residual analyzer – MEL/850 by Hach or equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. Perform disinfection in accordance with AWWA C651.
2. The Engineer will review disinfection procedure, designate dosage and will perform necessary water quality tests to verify that disinfection has been accomplished according to public health standards.

B. Flushing:

1. If water of sufficient quantity and pressure is available, flushing as specified here and after should be performed:

Prior to chlorination, mains shall be properly flushed by the Contractor. In general, flushing shall be performed at a flow rate required to achieve a minimum velocity of 2.5 feet per second (approximately 900 GPM in a 12-inch main, 400 GPM in a 8-inch main, 220 GPM in a 6-inch main, and 30 GPM in a 2-inch main). Flushing shall be performed for a sufficient period of time to allow for a minimum of 3 volume changes of water in the main (approximately 20 minutes per 1000-foot of main at the above flow rate).

C. Discharge:

1. Following disinfection, water with concentrations of chlorine shall be dechlorinated and discharged to the atmosphere.
 - a. The Contractor shall notify the Engineer and Owner of the specific location where chlorinated water will be discharged at least three (3) days in advance of proposed discharge.
2. Water with high concentrations of chlorine (residual greater than

2 mg/l) shall be dechlorinated to a level of 2 PPM or less prior to its discharge. Dechlorination shall be conducted by use of a line purge dechlorinator or other method acceptable to the Engineer. Dechlorination shall be in accordance with the manufacturer's instructions and AWWA C651, Section 4.5.

3.2 INSTALLATION

A. Calcium Hypochlorite:

1. Use only as a solution.
2. Pump into pipe with a suitable chemical feed pump.

3.3 APPLICATION

A. Special Techniques:

1. Disinfect pipes by the continuous feed or slug method.
 - a. Continuous feed method:
 - 1) Feed chlorine into pipe so water entering contains a maximum of 25 mg/l of available chlorine.
 - 2) Apply chlorine continuously until entire pipe is filled with chlorine solution.
 - 3) Retain treated water in pipe for at least 24 hours.
 - 4) Ensure that chlorine residual at end of test is at least 10 mg/l.
 - 5) Operate all valves and hydrants to insure disinfection. Manipulate valves to prevent super chlorinated water from entering existing distribution system.
 - b. Slug Method
 - 1) Slowly feed through the main a slug of water having a chlorine concentration of 100 mg/l so that all parts of the main and appurtenances are exposed to the highly concentrated solution for a period of at least three (3) hours.
 - 2) Water from existing distribution system or other approved supply source shall be made to flow at a constant measured rate, into the new main.
 - 3) At a point not more than ten (10) feet downstream from the beginning of the new main, water entering the new main shall receive a constant dose of free chlorine having a concentration of 100 mg/l.
 - 4) The free chlorine shall be measured as it moves through the main. If the level drops below 50 mg/l,

flow shall be stopped chlorination equipment shall be relocated to the head of the slug and as flow is resumed, chlorine shall be applied to restore the free available level to 100 mg/l.

- 5) Valves and hydrants shall be operated as the chlorinated water flows past them to insure disinfection occurs.

2. Ensure that appurtenances are fully disinfected.

3.4 FIELD QUALITY CONTROL

A. Tests:

1. Measure chlorine levels with meters or color-wheel. Paper pool strips are not acceptable methods for determining chlorine levels.
2. Bacteriological test samples shall be collected by the Contractor after the chlorine solution has been flushed out of the pipe.
3. Disinfection shall be repeated, as necessary, to produce satisfactory bacteriological samples.
4. Twenty-four (24) hours after the main has been dechlorinated and flushed, bacteriological samples shall be taken. Water samples shall be taken from corporation stops along the length of water main as designated by the Engineer. Twenty-four hours after the initial sampling round, a second round of water samples shall be taken. Samples shall be taken between each valved section of main and each capped end of main, each in duplicate, in sterile bottles and furnished to the Owner or Engineer for delivery to a State-approved laboratory for analyses.
5. The results of the tests on these samples will determine the acceptance of the work and allow these new mains to be connected to the Owner's system. The failure of any sample to pass the laboratory tests shall require the Contractor to re-flush and rechlorinate the mains and re-sample and test the water until acceptable results are obtained, all at no additional cost to the Owner.

B. Activation:

1. Upon receipt of satisfactory bacteria sample test results and successful pressure tests, Contractor shall notify Engineer. Copies of all test reports shall be given to the Engineer
2. Contractor shall note that work under this Contract shall not be considered completed until satisfactory installation and testing of the water mains have been completed.

3. All corporations installed for disinfection purposes shall be closed and plugged. All tubing shall be removed.

3.5 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

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SECTION 02704

PIPELINE PRESSURE AND LEAKAGE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Perform field hydrostatic pressure and leakage testing of interior and exterior pipes.
- B. Related section includes the following:
 - 1. Section 02615 – Exterior Ductile Iron Pipe and Fittings
 - 2. Section 02675 – Disinfection of Water Mains

1.3 DEFINITIONS

- A. Leakage - Leakage is defined as total amount of water introduced into pipe during leakage test to maintain test pressure.
- B. Piping – Piping and pipe are defined as pipe, main, valves, fittings, hydrants, corporations and all other items installed under this contract.

1.4 SYSTEM DESCRIPTION

- A. Pipe installed under this contract shall be tested in accordance with the requirements of this section.
- B. Furnishing, installation and removal of bulkheads required for testing.

1.5 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:

1. Testing schedule and test procedure.
 - a. Indicate proposed time and sequence of testing on schedule.
 - b. Indicated test procedure requirements as follows:
 - (1) Limits of each pipe to be tested.
 - (2) Position of all valves during testing.
 - (3) Other applicable procedures.
 - c. List and description of equipment (pumps, meters, gauges, etc.) to be utilized.

1.6 PROJECT/SITE CONDITIONS

- ### A. Contractor shall provide piping and fittings necessary for testing all pressure piping installed under this contract.

1.7 SEQUENCING AND SCHEDULING

- ### A. Complete leakage testing of pipes prior to final cleaning and disinfection; Engineer shall be present during all testing.
1. Notify Engineer of time and place of testing at least 3 working days prior to commencement of work.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- ### A. Provide test equipment as follows:
1. Piping connections between pipe tested, water source and pumps
 2. Equipment, materials, and facilities required to perform specified tests including but not limited to the following:
 - a. Pumping equipment.

- b. Calibrated pressure gauges.
- 3. Sectionalizing devices required including but not limited to the following:
 - a. Flanges
 - b. Valves

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Schedule testing with Engineer at least three (3) working days in advance of testing.

3.2 APPLICATION

A Leakage Testing:

- 1. Conduct leakage testing on newly installed water mains and connection to existing to water mains. Gate valves will be turned off north of the meter vault before the cross tee fitting.
- 2. Ensure that joints in piping are airtight and free from leaks during leakage test.
- 3. Leakage Test Pressure:
 - a. Maintain specified test pressure for duration of leakage test.
- 4. Leakage Measurement:
 - a.
 - b. Measure leakage by means of an approved calibrated barrel on the suction side of the pump.
 - (1) Ensure that water barrel is accurately calibrated.
- 5. Allowable Leakage:
 - a. There shall be zero vacuum pressure loss during entire time of leakage measurements.

3.3 FIELD QUALITY CONTROL

A. Inspection:

1. Locate defective joints and pipe materials during pressure testing.
2. Locate and repair leaking joints, valves and other defective items of work to reduce pipe leakage to an amount acceptable to Engineer, or where applicable, the Owner's requirements.

B. Repairs

1. Repairs to pipelines shall require removal of the defective section of pipe, joint, valve or fitting.
2. New materials to replace those replaced as described above shall be installed with mechanical joint solid sleeves. All mechanical joints shall be installed with restraints as specified in Section 02615.
3. Disinfect the repair section in accordance with AWWA C651.

C. Upon completion of repairs, Contractor shall repeat the pressure-leakage test until satisfactory results are obtained.

D. All repairs, including labor, materials, equipment, and other related costs required to locate and repair defective work shall be performed at no additional cost to the Owner.

3.4 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 11210

SUBMERSIBLE WATER SUPPLY PUMP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Furnishing and installing three (3) submersible pumps, motors, and accessories.
- B. Related sections include the following:
 - 1. Section 01650 – Facility Start-up/Commissioning
 - 2. Section 02671 – Production Wells
 - 3. Section 02673 – Pitless Adapter
 - 4. Section 11200 – Interior Process Piping
 - 5. Division 16 – Electrical
- C. Contractor shall coordinate electric pump motor supplier with VFD supplier to ensure system compatibility. Refer to Section 16495 for Variable Frequency Drives.
- D. Pump operational and dimensional data presented herein is based upon field estimates from wells. After the well is fully developed, the Contractor shall submit well construction and yield data such as specific capacity to the Engineer. The data from the fully developed well shall be reevaluated, prior to furnishing and installing the pumps and associated equipment.

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES:
 - 1. Operating and Maintenance Manuals: Include manufacturer's instructions for equipment installation, start-up, operation, and

maintenance, including parts lists for operation and maintenance manuals specified in Division 1.

2. Shop Drawings: Include illustrations, dimensions, materials, performance and wiring diagrams, and pump curves. Provide motor data including dimensions, horsepower ratings, efficiency, cooling requirements and electrical data.
3. Certified Performance Test Reports: Submit certified report performance test requirements specified in Source Quality Control of this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Section 01610.
- B. Store pumps and motors on site according to pump and motor manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE PUMPS

- A. Submersible pump and motor shall comply with the requirements of paragraph 3.5 - Schedules. Subject to compliance with requirements specified, submersible pump shall be Grundfos Model No. 385S100-2BA as manufacturer by Grundfos, or approved equal.
- B. Pump Bowls: The bowls and discharge adapter shall be type 304 stainless steel. A thrust ring shall be above the top impeller to prevent excessive vertical upthrust.
- C. Bowl Shaft and Bearings: The bowl shaft shall be constructed from high tensile, Type 431 stainless steel manufactured in accordance with ASTM A276. Shaft shall be ground and polished for smooth bearing surface. Intermediate bearings shall be Buna-N and the upper bearing shall be type 304 stainless steel. Protect bearings with a sand cap.
- D. Pump-to-motor coupling shall be accurately machined stainless steel coupling providing perfect alignment, balance and power transmission.
- E. Submersible Power Cable: Single cable assembly with three conductors plus ground conductor and shall be included in a single continuous jacketed assembly. Insulate each conductor for continuous immersion in water and oil resistant. Protect cable with a steel guard where it passes the bowl assembly to prevent damage from contact with the well casing. Provide water-resistant plastic coated cable ties or other non-metallic means to support the cable at maximum intervals of 20-foot along the riser pipe. Size cable as required for

the motor according to the National Electrical Code. No splices are allowed between the motor and the disconnecting means.

- F. Impeller: The impeller shall be closed type, type 304 stainless steel, mechanically and hydraulically balanced, and locked to the shaft with stainless steel taper collets.
- G. Inlet Screen shall be Type 304 stainless steel designed to prevent entrance of damaging solids into the bowl assembly.
- H. Column Pipe: Shall be high tensile stainless steel pipe, in sections not longer than 10 feet, with the ends machined with 8 threads per inch with 3/4" taper. Pipe shall be connected with threaded sleeve type steel couplings.
- I. Check Valve: The pump shall be furnished with an integral; check valve assembly which shall prevent backspin on the bowl and motor assembly. The valve components and valve casing shall be type 304 stainless steel.
- J. Motor: Motor shall be across-the-line starting, designed with normal starting torque and low starting current, and capable of continuous operation under water. Motors shall meet requirements listed in Paragraph 3.5 – Schedule.
 - 1. Motor Thrust Bearings: Carry the weight of rotating parts, plus the hydraulic thrust of the pump unit.
 - 2. Motor Bearings: Bearings shall be Kingsbury-type thrust bearings. They shall be sized for an average life rating which is based on 5-years continuous operation. Motor bearings shall be protected from shaft current produced by common mode voltages and other electromagnetic interaction of the motor and VFD.
 - 3. Motor shall be 460 volt design.
 - 4. Motor shall be furnished with a flow inducer sleeve or discharge tube to insure maximum cooling water flow.
 - 5. All motors shall be heavy-duty type; lubricant shall be food grade mineral oil or water compatible with potable water applications.
 - 6. Operating Point: Develop sufficient torque to start the pump full of water and accelerate to full speed, and continue to operate without entering the service factor.
 - 7. Furnish three (3) motor manufacturer's standard, ambient-compensated type, quick trip overload protectors for use in motor starter, to provide extra quick trip protection for locked rotor at low temperatures and to avoid nuisance tripping at high temperatures. To be installed under Division 16.

8. Manufacturers: Grundfos or approved equal.

2.2 SOURCE QUALITY CONTROL

- A. Perform factory tests to certify that pumps meet the specified requirements for head and capacity and are within vibration limits.
- B. Performance testing shall be conducted in accordance with Hydraulic Institute Standards and shall consist of a minimum of five (5) test points. Performance tests shall be conducted Level B performance. The tolerance range for flow shall be +5% and for head -3% maximum.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The pump shall be installed according to manufacturer's printed recommendations.
- B. The manufacturer's factory trained representative shall be present during the installation of the pump for a minimum of 4 hours to direct the Contractor in proper installation.

3.2 WELL DISINFECTION (POST PUMP INSTALLATION)

- A. After pump installation, and before initiating well operation, disinfect well. Contractor shall note that this is in addition to disinfection requirements specified in Section 02671. Use methods in accordance with applicable AWWA Standards.
 - 1. Bring chlorine residual concentration in the well to at least 50 ppm.
 - 2. Maintain solution for at least 8 hours prior to flushing.
 - 3. Dechlorinate and pump water from well to waste until the chlorinated water has cleared. Dechlorination shall be as specified in Section 02675.
 - 4. Submit a minimum of two (2) water samples to a State certified laboratory for analyses. The Contractor shall perform necessary work including delivery of samples to the laboratory and shall include the cost for sampling and analysis in his bid price.
 - 5. If laboratory bacteriological analysis reports water is unsatisfactory for domestic purposes, repeat the chlorination and testing procedures until satisfactory results are achieved at no additional costs to the Owner.

3.3 TESTING AND ADJUSTING

- A. Retain the services of a factory-authorized service representative and electrician to inspect installation and supervise pre-start-up and final performance tests. Electrician shall confirm proper wiring connections to the motors and also measure and record power consumption during pre and final start up tests.
- B. During the tests, observe head, capacity, motor input, and general performance and fitness (pump and motor). Repair or replace defective equipment and repeated tests until satisfactory results are achieved.
- C. Operate the pump at 100% speed at four flow points: Shutoff head (0 GPM); Intermediate flow (175 GPM); Design flow (300 GPM) and one additional point (400 GPM). Pump levels and discharge pressures to be recorded and a pump curve to be drawn showing operation points at 100% speed.

After testing pump at 100% speed, repeat the 3-point test for pump operation at 75% speed. Procedures shall be as specified above.

- C. Adjust equipment to achieve indicated performance. Equipment (pump and motor), which is not capable of providing required flows at specified heads, or does not meet approved pump curve data, shall be adjusted or, if required, removed and replaced at no additional cost to the Owner.

3.4 DEMONSTRATION

- A. Provide the services of a factory-authorized service representative to training of Owner's maintenance personnel in proper operation, servicing, and maintenance of equipment. Allow 2 hours for training. Conduct training at the pump station, after and separate from the start-up tests. Training time shall be scheduled with the Owner.

3.5 SCHEDULES

SUBMERSIBLE PUMP

WELL PERFORMANCE CHARACTERISTICS

<u>Description</u>	<u>Flow (GPM)</u>	<u>Total Dynamic Head (Ft.)</u>	<u>Pump Bowl Efficiency (%)</u>	<u>Min. Wire-water Efficiency (%)</u>
Shutoff	-0-	126	-0-	-0-
Point 1 (Design)	300	91	76	62
Point 2	350	79	78	63

Note: Pump shall meet performance point requirements in accordance with National Hydraulics Institute Standard Level B performance. Tolerance range for flow shall be +5% and for head -3% maximum.

MOTOR CHARACTERISTICS

Horsepower = 10 HP

Voltage = 460 Volts

Phase = 3 Phase

RPM = 3,450 RPM

Diameter = 6-inches

Service Factor = 1.15

Motor Efficiency = 81% (full load); 81% (service factor – max load)

Pump length from discharge spring line of pitless adapter to the bottom of the motor: 25 feet*

* The pump length is approximate. Pump length must be verified after the wells are fully developed.

WELL CHARACTERISTICS

Pitless Adapter Discharge Diameter = 6 inches

Well Inner Casing Diameter = 18 inches

Well Outer Casing Diameter = 24 inches

END OF SECTION

SECTION 11215

WELL LEVEL CONTROL SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the following:

1. Provide a submersible pressure transducer for monitoring water level and providing shut off control to the pump. The level control shall provide automatic safety shutdown of pump if well level reaches a field-adjustable set point of 2-feet above the pump intake.
2. Contractor shall coordinate equipment with wiring and controls furnished and installed by the electrical subcontractor under Division 16.

- B. Related sections include the following:

1. Section 02671 – Production Wells
2. Section 02673 – Pitless Adapter
3. Section 11210 – Submersible Water Supply Pumps
4. Division 16 – Electrical

1.3 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES:

1. Shop Drawings shall include materials lists, and manufacturer's certificates, catalog cuts, and complete specifications for all level control equipment.
2. Submittals shall include wiring and control diagrams and dimensional drawings of all components of the system.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610 and as specified.

PART 2 – PRODUCTS

2.1 LEVEL SENSOR

- A. The level-sensing element shall be a pressure transducer that has been designed for submersible service. It shall have a minimum over-pressure capability of 1-1/2- times the maximum water level to which it will be subjected. Accuracy shall be \pm 0.5 percent of transducer range. The transducer shall provide a 4-20 mA signal over an approximate range of 0-35 feet.
- B. The Contractor shall supply the two wire transducer with a cable long enough to be suspended in the well from the top of the screen to the top of the well plus three feet.
- C. The level sensor shall have type 316 stainless steel housing and shall be sized such that it can be installed in $\frac{3}{4}$ " flexible polyethylene tubing which is capped at the desired installation depth and secured to the well casing.
- D. The pressure transducer system shall have adequate lightning protection. The control cabinet in the well building shall have one arrester incorporated in its level sensing circuitry and a second arrester shall be incorporated in pitless adapter at the transducer head. The lightning arresters must be designed to function with the chosen level sensor.
- E. Level sensor shall be Micro-bore Submersible Level Transmitter as manufactured by Keller America, or approved equal.

2.2 OPERATION

- A. The level control system shall contain safety features that will stop the pump if the well level falls below the set point (2-feet above the pump intake) or if the level signal is lost.
- B. If any of these conditions exist for any adjustable time delay period, 10 to 90 seconds, the safety circuit shall cause the pump to be shut down and have its control circuit locked out. This condition shall be indicated by a red "Motor Stop" light located on the front control cabinet. It shall be necessary for the operating personnel to make a visual inspection and manually reset the controls to start the pump. One auxiliary contact wired to a numbered terminal strip shall be provided for remote indication of safety shut-down.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The level sensor shall be installed according to manufacturer's printed recommendations.

3.2 TESTING

- A. The surge and level control system shall be tested to show that it is capable of operating as specified in Paragraph 2.2.
- B. The Contractor shall adjust, repair or replace the components as required to perform as specified, at no additional cost to the Owner.

END OF SECTION

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SECTION 15500
HEATING, VENTILATION AND AIR
CONDITIONING

PART 1 - GENERAL

1.0 DESCRIPTION

- A. The Work of this section includes all labor, tools, material, fittings, accessories and equipment necessary to furnish and install, place in operation and test, adjust and balance the heating, ventilating and air conditioning systems as specified herein and as shown on the Drawings. The work of DIVISION 15 – HEATING, VENTILATION AND AIR CONDITION requires the subcontractor to perform all work specified under DIVISION 15 – HEATING, VENTILATION AND AIR CONDITIONING.

- B. Reference Drawings
 - 1. The work of DIVISION 15 – HEATING, VENTILATION AND AIR CONDITION is shown on drawing(s) numbered: H-1 and H-2.

- C. The Work includes, without limiting the generality thereof:
 - 1. Heat pump systems
 - 2. Testing, adjusting and balancing.

1.2 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Hangers and supports
 - 2. Pipe and Insulation
 - 3. Heat Pump

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 16085, Miscellaneous Equipment

- B. Section 16120, Wire and Cables

1.4 DESIGN CRITERIA

- A. The Work of this section shall comply with the requirements of the Massachusetts State Building Code and of all other authorities having jurisdiction.

- B. The equipment covered by the Specifications is intended to be standard equipment of proven quality as manufactured by reputable concerns. Equipment shall be designed,

constructed and installed in accordance with the best practice of the industry and shall operate satisfactorily when installed in accordance with the Contract Documents. The Specifications call attention to certain details, but do not purport to cover all details entering into the construction of the equipment.

- C. All material shall be new and shall bear the manufacturer's full identification.
- D. Requirements of Regulatory Agencies
 - 1. The final, complete installation shall comply with all state and local statutory requirements having jurisdiction. Arrange for all necessary permits, pay all fees and arrange for all required inspections by state and local authorities.
 - 2. In general, all Work shall comply with the requirements of rules, regulations, standards, codes, ordinances, and laws of local, state, and federal governments, and other authorities that have legal jurisdiction over the Project Site. Materials and equipment shall be manufactured, installed and tested as specified in latest editions of applicable publications, standards, rulings and determinations of:
 - a. Local and state building, HVAC, plumbing, mechanical, electrical, fire and health department codes.
 - b. National Fire Protection Association (NFPA).
 - c. Occupational Safety and Health Act (OSHA).
 - d. Underwriters' Laboratories (UL).
 - e. Material and equipment shall be listed by Underwriters' Laboratories (UL), and approved by ASME for intended service.
 - 3. When requirements cited in the Specifications conflict with each other or with Contract Documents, most stringent shall govern Work.
 - 4. Most recent editions of applicable specifications and publications of the following organizations form part of Contract Documents:
 - a. American National Standards Institute (ANSI).
 - b. American Society of Mechanical Engineers (ASME).
 - c. National Electric Manufacturers Association (NEMA).
 - d. American Society for Testing and Materials (ASTM).
 - e. American Society for Heating, Refrigerating and Air Conditioning

Engineers (ASHRAE).

- f. Air Moving and Conditioning Association (AMCA).
- g. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
- h. Air Conditioning and Refrigeration Institute (ARI).
- i. Thermal Insulation Manufacturers Association (TIMA).
- j. Institute of Electrical and Electronics Engineers (IEEE).
- k. Insulated Cable Engineers Association (ICEA).
- l. International Energy Conservation Code 2015 ed.

E. Tests, Adjusting and Balancing

- 1. Test all systems furnished under this section 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 all systems.
- 2. Defined to include, but not necessarily limited to, air distribution systems, and associated equipment and apparatus of mechanical Work. Work consists of recording data, conducting tests, preparing and submitting reports, and recommending modifications to Work as required by the Contract Documents.
- 3. Startup the following pieces of equipment in strict accordance with manufacturer instructions.
 - a. Heat Pump
- 4. Submit certified test reports signed by test and balance supervisor performing TAB Work.
- 5. Include identification and types of instruments used and most recent calibration date with submission of final test report.
- 6. Shop Drawings
 - a. Submit sample test data forms complete with certifying agency logo, identifying required test data, date, page number, system designation, system location, Project name, and balancer's name.
- 7. Tester's Qualifications: Firm with at least 3 years successful testing, adjusting, and balancing experience on projects with testing and balancing requirements

similar to those required for the Project, not installer of system to be tested, and otherwise independent of the Project.

8. NEBB or AABC Compliance: Comply with either National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, as applicable to mechanical air distribution systems and associated equipment and apparatus.
9. Industry Standards: Comply with ASHRAE recommendations pertaining to measurements, instruments, and testing, adjusting, and balancing except as otherwise indicated.
10. Do not proceed with testing, adjusting, and balancing Work until each system is complete and operable. Ensure no later residual Work still to be completed.
11. Do not proceed until Work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt, and discarded building materials.
12. 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.
13. Upon completion of the work herein described, the Testing Firm shall submit Test and Inspection Reports to the Engineer.
14. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.
15. Upon completion of the remedial work, the Testing Firm shall repeat all of the tests on components previously found deficient on the first test or any additional test if they be required. Have all remedial Work accomplished as may be required by second and/or additional tests.

1.5 PRODUCT HANDLING

- A. All materials and equipment shall be shipped, stored, handled and installed in such manner as not to degrade quality, serviceability, or appearance.
- B. Store all materials and equipment on site in a location approved by the Engineer.
- C. Protect all work, the Owner's property and the property of others from injury or loss caused by operations associated with the Work of this section. Make good any such injury or loss, at no cost to the party suffering the injury or loss.

1.6 PROCEDURE

- A. Secure all required permits, inspections, and approvals and pay all costs and fees.
- B. Unless the Specifications state "No Substitutions", substitutions will be considered for any specified item.
- C. Coordinate safety program with that of the Contractor. Cooperate with other Subcontractors to establish lines, levels, openings, chases, clearances, and locations to avoid interference; and to protect the Work.
- D. Deliver all materials as needed to avoid delays.

1.7 INTERPRETATION OF DRAWINGS

- A. Listing of Drawings does not limit responsibility of determining full extent of Work required by the Contract Documents. Refer to Architectural, HVAC, Electrical, Structural, and other Contract Drawings and other sections that indicate types of construction in which Work shall be installed and Work of other trades with which Work of this section must be coordinated.
- B. Except where modified by a specific notation to the contrary, the indication and/or description of any item, in the Contract Drawings or Specifications or both, carries with it the instruction to provide the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.
- C. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete Work.
- D. Drawings are diagrammatic. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the Contract Drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the contractor shall provide all other components and materials necessary to make the systems fully complete and operational.
- E. Data that may be furnished electronically by the Engineer (on computer tape, diskette, or otherwise) is diagrammatic. Such electronically furnished information is subject to the same limitation of precision as heretofore described. If furnished, such data is for convenience and generalized reference, and shall not substitute for the Engineer's sealed or stamped construction documents.

1.8 DISCREPANCIES IN DOCUMENTS

- A. Where Contract Drawings or Specifications conflict or are unclear, advise the Engineer in writing before Award of Contract. Otherwise, the Engineer's

interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies thus resolved.

- B. Where Contract Drawings or Specifications do not coincide with manufacturers' recommendations or with applicable codes and standards, alert the Engineer in writing before installation. Otherwise, make changes in installed Work as the Engineer requires at no additional cost to the Owner.
- C. If the required material, installation, or Work can be interpreted differently from drawing to drawing, or between Contract Drawings and Specifications, the Subcontractor shall provide that material, installation, or Work which is of the higher standard.
- D. Provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information exists to precisely describe a certain component or subsystem, or the routing of a component. In cases such as this, where the Subcontractor has failed to notify the Engineer of the situation as specified, provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.
- E. In cases covered by Paragraph (D) above, where the Subcontractor needs engineering guidance, submit a sketch identifying his proposed solution and the Engineer shall review, note if necessary, and approve the sketch.

1.9 MODIFICATIONS IN LAYOUT

- A. Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other Work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet Architectural requirements.
- B. Check Contract Drawings as well as Shop Drawings of all trades to verify and coordinate spaces in which Work of this section will be installed.
- C. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.
- D. Make reasonable modifications in layout and components needed to prevent conflict with Work of other trades and to coordinate as specified. Systems shall be run in a rectilinear fashion.
- E. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to the Engineer for review and approval.

1.10 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 duration of the Contract, maintain complete and separate set of prints of Contract Drawings at the Project Site at all times. 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.
- C. At completion of Work prepare a complete set of reproducible record drawings showing all systems as actually installed.
- D. The Engineer will not certify the accuracy of the Record Drawings. This is the responsibility of the Subcontractor.
- E. This trade shall submit the record set for approval by the building department in a form acceptable to the department, when required by the jurisdiction.
- F. Drawings shall show record condition of details, sections, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.11 ELECTRICAL WORK

- A. Except for electrical apparatus specifically called for as part of this Section, all switches and controllers required will be provided under DIVISION 16 - ELECTRICAL.
- B. All electrical apparatus and controls furnished as a part of the Work of this section shall conform to applicable requirements under DIVISION 16 - ELECTRICAL. Enclosure types shall be as indicated on the Contract Drawings.
- C. All electrical apparatus furnished under this section shall be approved by UL and shall be labeled or listed where such is applicable.

1.12 WARRANTIES

- A. Submit manufacturer's standard replacement warranties for material and equipment furnished under this section. Such warranties shall be in addition to and not in lieu of all liabilities, which the manufacturer and the Subcontractor may have by law or by provisions of the Contract Documents.
- B. All materials, equipment and work furnished under this section shall be guaranteed against all defects in materials and workmanship for a minimum period of 1 year commencing with the Date of Substantial Completion and Final Acceptance by the Owner. Any failure due to defective material, equipment or workmanship which may

develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.

- C. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Contract Drawings.
- D. Upon receipt of notice from the Owner of the failure of any part of the systems during the guarantee period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be placed.

1.13 SURVEY AND MEASUREMENTS

- A. Base all required measurements, horizontal and vertical, from referenced points established by the Contractor and be responsible for correctly laying out the Work required under this section of the Specification.

1.14 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 and as specified herein.
- B. All manufactured materials shall be delivered to the Project Site in original packages or containers bearing the manufacturer's labels and product identification.
- C. Protect materials against dampness. Store off floors, under cover, and adequately protected from damage.
- D. Deliver products to the Project Site and store and protect same as recommended by the manufacturer.
- E. Inspect all HVAC equipment and materials, upon receipt at the Project Site, for damage and correctness.

1.15 PROTECTION OF WORK AND PROPERTY

- A. Care and protect for all Work included under this section until it has been tested and accepted.
- B. Protect all equipment and materials from damage from all causes including theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment.
- C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this section and make good damage thus caused.

1.16 SAFETY PRECAUTIONS

- A. Comply with all of the safety requirements of OSHA throughout the entire construction period of the Project.

- B. Provide and maintain proper guards for prevention of accidents and any other necessary construction required to secure safety of life and/or property.

1.17 SPARE PARTS

- A. Furnish spare-parts data for every component that is required to be maintained for normal service of equipment furnished. The data shall include a complete list of parts and supplies, with current unit prices and source of supply; a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment, or specified hereinafter to be furnished as part of the Contract; and a list of additional items recommended by the manufacturer to assure efficient operation for a period of 180 days at the particular installation. The foregoing shall not relieve the Subcontractor of any responsibilities under the guarantees specified herein.

1.18 HOISTING, RIGGING, SCAFFOLDING AND PLANKING

- A. The Work to be done under this section of the Specifications shall include the furnishing, set-up and maintenance of all derricks, hoisting machinery, scaffolds, staging, planking, ladders, etc. as required for the Work.

1.19 SLEEVES, INSERTS, ANCHOR BOLTS, AND PLATES

- A. Be responsible for the location of and the maintaining in proper position all sleeves, inserts and anchor bolts supplied and/or set in place. In the event that failure to do so requires cutting and patching of finished Work, it shall be done at this Subcontractor's expense without any additional cost to the Owner.

1.20 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

- A. Provide all supplementary steel, channels and supports required for the proper installation, mounting and support of all HVAC equipment, piping, etc., required by the Specifications.
- B. Supplementary steel and channels shall be firmly connected to building construction in a manner approved by the Engineer.
- C. The type and size of the supporting channels and supplementary steel shall be determined by the Subcontractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All steel used for supplementary steel, channels and supports shall be A36 steel.

1.21 CERTIFICATES OF INSPECTION/APPROVAL

- A. Furnish upon completion of all Work, certificates of inspections from the manufacturers stating that authorized factory engineers have inspected and tested the

operation of their respective equipment and found same to be in satisfactory operating conditions.

1.22 ACCESSIBILITY

- A. All Work shall be installed so that parts requiring inspection, operation, maintenance and repair are readily accessible. Minor deviations from the Contract Drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to receipt of written approval from the Engineer.

1.23 DEFINITIONS

- A. As used in this section, the following terms are understood to have the following meanings:
 - 1. "Furnish" shall mean purchase and deliver to the project site, complete with every necessary accessory and support.
 - 2. "Install" shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting, proper location and operation in the project.
 - 3. "Provide" shall mean furnish and install.
 - 4. "Work" shall mean all labor, materials, equipment, apparatus,, controls, accessories, and all other items required for a proper and complete installation.
 - 5. "Piping" shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.
 - 6. "Concealed" shall mean hidden from sight in chases, furred spaces, shafts, embedded in construction or in crawl space.
 - 7. "Exposed" shall mean not installed underground or concealed as defined above.
 - 8. "Furnished by others" shall mean materials or equipment purchased and set in place under other sections of the general contract and connected to the systems covered by this section of the specifications by this trade contractor.
 - 9. "Coordinate" shall mean all work provided under this section of the specification shall be in compliance with work of other trades.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Refrigerant piping shall be ACR copper tubing with wrought copper sweat fittings.
- B. AC condensate drain piping shall be type DWV PVC tubing with solvent socket fittings.

2.2 HANGERS AND SUPPORTS

- A. Pipe hangers shall conform to MSS SP 58 and SP 69. Pipe hangers for 3 -inch pipe and under shall be clevis type. Pipe hangers for pipe less than 2 inch may be 1A band type in lieu of clevis type. Hangers in contact with copper tubing shall be copper plated.
- B. All hangers shall be sized to fit the piping o.d.
- C. Where support points are required to avoid other Work, provide a system of channels and angles between support points as required. Provide all necessary supports and cross framing. No part of piping, ductwork, equipment, and the building shall be stressed beyond its normal allowable working strength.

2.3 PIPING SPECIALTIES

- A. Sleeves:
 - 1. Provide sleeves at all penetrations. Sleeves shall be A36 steel. Sleeves shall be sized to allow 1/2 inch of annular space between the covering (or bare pipe) and the inside of the sleeve.
 - 2. Pipe penetrations of walls below grade shall be sleeved and sealed using Thunderline Link-Seal wall sleeves and seals.
 - 3. Pack the annular space with non-combustible (as defined by ASTM E136) fire stopping material, and seal with non-combustible caulking flush with finished surface.
 - 4. Sleeves in concrete construction shall be galvanized steel pipe, except where passing through exterior walls and slabs-on-grade they shall be ductile iron. Sleeves passing through floors shall project two inches above the finish floor and sleeves passing through walls shall be trimmed flush with the wall surface.

2.4 DUCTLESS SPLIT SYSTEM HEAT PUMP

- A. The variable capacity heat pump air conditioning system shall be a variable-refrigerant- volume low ambient split system as indicated. The system shall consist of multiple evaporators and a two-pipe refrigeration distribution system using PID control. The outdoor unit is a direct expansion (DX), air-cooled heat pump with

variable speed driven compressors using R-410A refrigerant. Provide with individual temperature control.

- B. Trane, Daikin, York, or equal. Unit cabinet shall be 20-gauge galvanized steel, with prime coat and two-part epoxy finish.
- C. The indoor units shall be connected to the condensing unit utilizing proprietary piping joints and headers to ensure correct refrigerant flow and balancing. The manufacturer shall submit piping installation drawings as required.
- D. Provide interconnecting piping and interlock wiring.
- E. R410a refrigerant.
- F. Heating capability must be available when the outside temperature is as low as -4°F. Cooling capability must be available when the outside temperature is as low as 0°F.
- G. Energy Star Tier II rated.
- H. Each condensing unit shall use a high efficiency, variable speed “inverter” compressor coupled with inverter fan motors for part load performance. Compressor capacity shall be modulated automatically to maintain a constant suction pressure, while varying the refrigerant volume for the needs of the cooling or heating loads. Indoor fan coil units shall use PID control to control superheat to deliver a comfortable room temperature condition.
- I. The condensing unit coil shall be constructed of copper tubes with aluminum fins. Coil shall be completely heresite coated for corrosion resistance.
- J. Provide compressors with crankcase heater to prevent oil dilution on off cycle, and suction line thermostat to stop compressor when suction line temperature falls below setpoint.
- K. Provide 24-inch-high support stand for outdoor condensing units to lift units off the ground. Stand shall be equal to Quick Sling by DiversiTech.
- L. Provide circuit to lock compressor off when safety controls have been activated. Unit shall not be restartable until room thermostat has been turned off and on.
- M. Provide factory-mounted air filters.
- N. The drain pan shall be constructed to inhibit corrosion and fully insulated. Drain outlet shall be located on pan as to allow complete and unobstructed drainage of condensate. Vertical units will be supplied with factory installed trap inside of cabinet. The unit as standard shall be supplied with a solid-state electronic condensate overflow protection system conforming to UL 508 that shuts off the unit when the primary drain is blocked. Mechanical float switches will not be accepted.
- O. Insulate evaporator and compressor compartment panels with 1-1/2 lb. fibrous glass insulation.

- P. Provide either direct drive ECM or belt-driven evaporator blowers with common shaft and three speed switch. Belt-driven evaporator blower motor shall be 1750 rpm, three-phase, with inherent overload protection or starter with quick trip heaters and sealed ball bearings.
- Q. Control (Stand-Alone Individual Fan Coil Unit Control)
 - 1. The unit shall have microprocessor based programmable deadband-type thermostats provided by the manufacturer to perform input functions necessary to operate the system.
 - a. Monitors room temperature and preset temperature by microcomputer and can select cool or heat operation modes automatically based on the set-point requirement.
 - b. Selectable auto / cool / heat / dry operation modes with adjustable temperature and airflow rates.
 - c. Built in one time or daily timer functionality with up to 2 timer actions per day.
 - d. LCD lets you display set point temperature in either °F or °C units in 1 degree increments.
- R. Install piping according to manufacturer's recommendations.
- S. Both refrigerant lines shall be completely insulated from the outdoor unit to the Fan Coil. Hot gas lines if required shall be insulated from the outdoor unit to the Fan Coil.
- T. Provide concrete splash blocks at outdoor terminations of condensate piping. Blocks shall be equal to those manufactured by MBO Precast of Carver, Massachusetts.
- U. Provide factory startup.
- V. Provide factory inspection of the installation and correction of the installation as required to satisfy the factory's recommendations.

2.4 INSULATION

- A. All insulation, adhesives, tape, etc. shall conform to NFPA 90A and the 2015 International Energy Conservation Code. No voids in insulation will be permitted.
- B. Pipe and equipment insulation shall be as specified herein.
 - 1. Installation shall meet manufacturer's recommendations. Seal butt joints and exposed ends with insulation manufacturers approved adhesive.
 - 2. Outside above ground insulation shall be protected with two coats of approved vinyl lacquer coating over woven glass mesh adhered to insulation with Insulcolor or approved equal lagging adhesive, as recommended by manufacturer.
 - 3. Insulation for refrigerant and condensate piping and fittings:
 - a. All refrigerant piping shall be insulated with 1-inch thick elastomeric

pipe insulation with a UV resistant barrier.

- b. All condensate piping shall be insulated with 1/2-inch-thick elastomeric pipe insulation with a UV resistant barrier.

2.5 SEQUENCE OF OPERATION

- A. Control sequences of operation shall be as indicated as follows:

1. DUCTLESS SPLIT SYSTEM HEAT PUMP

The Fan Coil for the Heat Pump system shall cycle as needed to maintain a room setpoint temperature of 65 deg F(adjustable).

PART 3 - EXECUTION

3.1 GENERAL

- A. Install all items specified under this section according to the manufacturer's requirements, shop drawings, the details as shown on the Contract Drawings and/or as specified.
- B. Install all Work so that parts requiring inspection, replacements, maintenance and repair shall be readily accessible. Minor deviations from the Contract Drawings may be made to accomplish this, but any substantial change shall not be made without prior written approval from the Owner.
- C. Equipment bases mounted on concrete slabs and pads, or mounted on stands, gratings, platforms, or other, shall not be set in any manner, except on the finished and permanent support.
- D. Support of equipment on studs or other means, and the placing or building of the supporting slab, pad, pier, stand, grating, or other "to the equipment", is prohibited.
- E. Concrete supporting structures shall have been constructed and cured a minimum of 14 days before equipment is mounted.

3.2 OPENINGS

- A. The responsibility for determining the exact size and location of openings is part of the Work of this section. If this responsibility is not met, cutting and patching to achieve the correct size and location of openings and chases is part of the work of this section.

3.3 CUTTING AND PATCHING

- A. Do all cutting and patching required except cutting and patching of finish (visible) materials. Cutting and patching of masonry walls, partitions, ceilings and floors is included. Concrete cutting shall be done with abrasive wheels or saws, and coring

with a diamond core bit. Jackhammers are prohibited.

3.4 CONNECTIONS TO EQUIPMENT

- A. Connections shall be provided by the Subcontractor unless otherwise indicated. Unless otherwise indicated, the size of the connections to each piece of equipment shall be not smaller than the connections on the equipment. No bushed connections shall be permitted. Change in sizes shall be made with reducers or increasers only.

3.5 MISCELLANEOUS IRON AND STEEL

- A. All Work shall be cut, assembled, welded and finished by skilled mechanics. Welds shall be ground smooth. Stands, brackets, and framework shall be properly sized and firmly constructed.
- B. Measurements shall be taken on the job and worked out to suit adjoining and connecting Work. All Work shall be by experienced metal working mechanics. Members shall be straight and true and accurately fitted. Scale, rust, and burrs shall be removed. Welded joints shall be ground smooth where exposed. Drilling, cutting and fitting shall be done as required to properly install the work and accommodate the work of other trades as directed by them.
- C. Members shall be generally welded, except that bolting may be used for field assembly where welding would be impractical.
- D. All shop fabricated iron and steel work shall be cleaned and dried and given a shop coat of paint on all surfaces and in all openings and crevices.

3.6 SUPPORTS AND BASES

A. General

- 1. Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while supporting the load.
- 2. In addition to supports and hangers, provide all bases and supports not part of the building structure, of required size, type, and strength, as approved by the Engineer, for all equipment and materials furnished by him. All equipment, bases and supports shall be adequately anchored to the building structure to prevent shifting of position under operating conditions.
- 3. All concrete foundations and all concrete supports will be provided by the General Contractor. Furnish shop drawings and templates for all concrete foundations and supports for setting all required hanger and foundation bolts and other appurtenances necessary for the proper installation of his equipment.

B. Pipe Hangers and Supports

1. Pipe hangers and supports shall conform to MSS SP-58 and MSS SP-69, except as specified as follows:
 - a. Types 5, 12, and 26 shall not be used.
 - b. Type 3 may be used on insulated pipe if clamped directly to the pipe and if the clamp bottom does not extend through the insulation and the top clamp attachment does not contact the insulation during pipe movement.
 - c. Type 19 and 23 C-clamps shall be torqued per MSS SP-69 and have both locknuts and retaining devices, furnished by the manufacturer. Field- fabricated C-clamp bodies or retaining devices are not acceptable.
 - d. Type 20 attachments used on angles and channels shall be furnished with an added malleable iron heel plate or adapter.
 - e. Type 24 may be used only on trapeze hanger systems or on fabricated frames.
 - f. Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves.
 - g. Vertical pipe shall be supported at intervals of not more than 15 feet, except that pipe shall be supported not more than 8 feet from end of risers, and at vent terminations

3.7 INSULATION

A. Application - General

1. Installation: Except as otherwise specified, material shall be installed in accordance with the manufacturer's written instructions. Insulation materials shall not be applied until tests specified in other sections of the Specifications are completed. Material such as rust, scale, dirt and moisture shall be removed from surfaces to receive insulation. Insulation shall be kept clean and dry. Insulation shall not be removed from its shipping containers until the day it is ready to use and shall be returned to like containers or equally protected from dirt and moisture at the end of each workday. Insulation that becomes dirty shall be thoroughly cleaned prior to use. If insulation becomes wet or if aforementioned cleaning does not restore the surfaces to like new condition, the insulation may be rejected, and if rejected, shall be immediately removed from the jobsite. Joints shall be staggered on

multilayer insulation. Mineral fiber thermal insulating cement shall be mixed with demineralized water when used on stainless steel surfaces

B Refrigeration Piping.

1. Insulation shall be applied and sealed to make a vapor tight covering from the Condensing Unit outdoors to the Fan Coil inside the building. All joints and exposed ends of the insulation shall be sealed with vinyl lacquer over mesh as noted in paragraph 2.04.

3.8 PLACING IN SERVICE

- A. At the completion of performance tests and following approval of test result, recheck all equipment to see that each item is adequately lubricated and functioning correctly.

3.9 CLEANING AND ADJUSTING

- A. During the progress of the Work, clean up and remove all oil, grease, and other debris caused by the Work performed under this section.
- B. At the conclusion of the Project, clean and repair all areas and finishes as installed or affected by this installation of Work under this section.
- C. Equipment: Equipment shall be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. System shall be maintained in this clean condition until final acceptance. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Belts shall be tightened to proper tension.

3.10 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. All operating equipment installed under this section shall be placed in operation and shall function continuously in an operating test for a period of one hour without shutdown due to mechanical failure or necessity of adjustment. Prior to scheduling the Project Final Inspection and after completion of all installation and running adjustments, perform all work required to place the equipment in complete operating condition to meet all requirements under the Specifications.
- B. During this running test period, deliver to the designated representative of the Owner, through the Engineer, 6 complete sets of operating, service and replacement data for all equipment which will require operating maintenance or replacement and one copy of this literature shall be available during the instruction of the operating personnel while the other is checked for completeness by the Engineer.

END OF SECTION 15500

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SECTION 16050

ELECTRICAL GENERAL CONDITIONS
(Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16050, ELECTRICAL GENERAL CONDITIONS is a part of DIVISION 16 - ELECTRICAL which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. Requirements for Submitting Subbids
 - 1. Subbids for work under this Division shall comply with the requirements of M.G.L. c.149, s.44F; shall be filed in a form furnished by the Awarding Authority, in a sealed envelope, at the time and place stipulated in the DOCUMENT 00020, INVITATION FOR BIDS and DOCUMENT 00100, INSTRUCTIONS TO BIDDERS; and shall be accompanied by a Bid Deposit as specified.
 - 2. The following should appear on the upper left-hand corner on the envelope:

Name of Subbidder: _____

Subbid for: DIVISION 16 - ELECTRICAL

Project: _____

- C. The work of DIVISION 16 - ELECTRICAL requires the subcontractor to perform all work specified under DIVISION 16 –ELECTRICAL and as shown on drawings E-1, E-2, E-3, E-4, E-5, and E-6.

1.1 SCOPE

- 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 hereinafterspecified.
 - 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. Grounding systems
 9. Variable Frequency Drives
- C. Disconnect and make safe back to utility pole the pump station's electrical service and provide complete demolition of the pump station's electrical systems.
- D. Make all field connections to process instrument panels and other control panels furnished under other Divisions of these Specifications.
- E. Mount and wire process instruments 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.
- F. Mount and make field connections to "packaged" equipment furnished under other Divisions of these Specifications.
- G. Wire all miscellaneous equipment and devices furnished under other Divisions of these Specifications.
- H. Install and wire all thermostats, controllers and other devices furnished under other Divisions of these specifications which directly control HVAC equipment.
- I. 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 16050 – ELECTRICAL GENERAL CONDITIONS, and the following sub-sections:
 - a. Section 16060 – GROUNDING SYSTEM
 - 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 16495 – VARIABLE FREQUENCY DRIVES

4. Drawings: Work specifically required under this Section includes all Electrical work shown on or required by Contract Drawings E-1 thru E-6.

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment for the work described in this section will be made in accordance with the provisions of SECTION 01025, MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of the SECTION 00700, GENERAL CONDITIONS.

B. Submittals required under this section include, but are not limited to the following:

- 1. Panelboards
- 2. Lighting fixtures
- 3. Disconnect switches
- 4. Miscellaneous equipment
- 5. Generator (Add Alternate)
- 6. Automatic Transfer Switch (Add Alternate)
- 7. Variable Frequency Drives
- 8. Wire
- 9. Conduit
- 10. Wiring Devices
- 13. Boxes and fittings
- 14. Grounding System

D. Submit all other data as specified herein.

E. "As-built" copies of all shop drawings shall be submitted to the Engineer before final

inspection and acceptance.

- F. 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 16050, ELECTRICAL GENERAL CONDITIONS.
- G. No material shall be ordered or shop work started until the Engineer's approval of shop drawings has been given.
- H. 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.

1.4 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. 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.

1.5 DESIGN CRITERIA

- A. Service Characteristics
 - 1. Primary Utility Voltage: 13.8KV
 - 2. Secondary Building Voltage - High Level: 277/480V
 - 3. Secondary Building Voltage - Low Level: 120/208V
 - 4. All equipment and wiring shall be suitable for the applied voltage.
- B. Service and Metering
 - 1. The power company serving this project is Reading Municipal Light Department (RMLD).
 - 2. Services will be obtained at 480 Volts, 3-phase, 4-wire from pole mounted

transformers furnished and installed by RMLD.

3. The pump station's existing electrical service shall be disconnected and upgraded.
4. Furnish and install the meter socket, secondary service conduit, wire and connectors.
5. The power company will furnish and install the primary connections, pole mounted transformers and the utility meter.
6. Make all arrangements and coordinate with RLMD for obtaining service and overhead utility primary line extensions. The owner shall pay for Utility Company back chargers.

C. 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.

D. 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.
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, 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 air interrupter switches and circuit breakers.

E. NEMA Ratings for Electrical Enclosures

1. NEMA Type 12 for building interior.

2. NEMA Type 4 for building exterior.

1.6 RELATED WORK SPECIFIED ELSEWHERE.

- A. SECTION 02220, EARTHWORK - Excavation and backfilling, including gravel or sand bedding for underground electrical work.
- B. SECTION 03301, CONCRETE & REINFORCING STEEL - Concrete work, including concrete electrical duct encasement and equipment mounting bases.

1.7 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.

1.8 CUTTING AND PATCHING

- A. All openings required by the work of these Sections shall be planned for in advance. Any cutting and patching required by the lack of such planning shall be done by the General Contractor at the expense of this Contractor. It will be the responsibility of this Contractor to keep the General Contractor informed of all required openings.

1.9 HOISTING, SCAFFOLDING AND PLANKING

- A. The Work shall include the furnishing, set-up and maintenance of all derricks, hoisting machinery, scaffolds, staging, planking, ladders, etc. as required for the Work.

1.10 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 4 areas.

1.11 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 and receptacles systems are not indicated on the drawings but shall be furnished and installed under this section.
- H. Each lighting and each receptacle circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one single phase circuit is not allowed.
- I. 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.
- J. The locations of equipment, fixtures, outlets, and similar devices shown on the drawings are approximate only. Exact locations shall be determined by actual construction conditions, major deviations from locations shall be approved by the engineer. 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.
- K. Circuits on three phase panelboards shall be field connected to result in evenly balanced loads on each phase.

- L. Surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.
- M. 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.
- N. All connections to equipment shall be made as required, and in accordance with the approved shop and setting drawings.
- O. 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.

1.12 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.

1.13 RECORD DRAWINGS

- A. Record drawings shall be provided by this Contractor as specified in SECTION 00700, GENERAL CONDITIONS and SECTION 01030, SPECIAL PROVISIONS.

1.14 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. Furnish two drawings.
- C. Furnish and install all component interconnections.

1.15 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.

PART 2 - NOT APPLICABLE

PART 3 - NOT APPLICABLE

END OF SECTION 16050

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SECTION 16060

GROUNDING SYSTEM
(Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16060, GROUNDING SYSTEM is a part of DIVISION 16 - ELECTRICAL, which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. The work of SECTION 16060, GROUNDING SYSTEM requires the subcontractor to perform all work specified under this section.

1.1 SCOPE

- 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.

1.2 MEASUREMENT AND PAYMENT

- A. Measurement and payment for the work described in this section will be made in accordance with the provisions of SECTION 01025, MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

- A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of SECTION 00700, GENERAL CONDITIONS.
- B. Submittals required under this section include, but are not limited to the following:
 - 1. Conduit
 - 2. Wire
 - 3. Ground rods

1.4 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

PART 2 - PRODUCTS

2.1 CONDUIT

- A. Conduit shall be as specified under SECTION 16130, RACEWAYS AND FITTINGS.

2.2 WIRE

- A. Wire shall be as specified under SECTION 16120, WIRE AND CABLES.

2.3 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 be one 10 foot length. Ground rods shall be Copperweld, equal by A.B. Chance Co., or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Grounding electrode conductors shall be run in rigid conduits. Protecting conduits shall be bonded to the grounding electrode conductors at both ends.
- 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 meter
 - 2. Frame of each transformer
 - 3. Neutral of each transformer
 - 4. Service entrance circuit breaker
 - 5. Ground buses
 - 7. Generator
- E. Connect the following equipment by separate wire or cable to the ground bus in the distribution equipment servicing the equipment:
 - 1. Panelboards
 - 2. 480 Volt 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
 3. 120 Volt motors
- G. Bond the following N.E.C. approved electrodes together to form a ground grid system:
1. Metallic water main
 2. Building steel frame
 3. Steel reinforcing rods within concrete at 4 ft. intervals.
 4. Grounding rods and buses
 5. Buried bare copper conductors
- I. Grounding electrodes shall be driven where shown on the drawings. Spacing between electrodes shall be equal to or greater than twice the length of the electrodes.
- J. Exposed 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.
- K. 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.
- L. 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.
- M. 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.
- N. Do not allow water piping to be painted. If the connections are painted, they shall be disassembled and remade with new fittings.

3.2 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.

END OF SECTION 16060

SECTION 16085

MISCELLANEOUS EQUIPMENT (Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16085, MISCELLANEOUS EQUIPMENT is a part of DIVISION 16 - ELECTRICAL which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. The work of SECTION 16085, MISCELLANEOUS EQUIPMENT requires the subcontractor to perform all work specified under this section.

1.1 SCOPE

- A. The work of this section includes the furnishing and installing of all miscellaneous equipment as specified herein and as shown on the drawings.

1.2 MEASUREMENT AND PAYMENT

- A. Measurement and payment for the work described in this section will be made in accordance with the provisions of SECTION 01025, MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

- A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of the SECTION 00700 - GENERAL CONDITIONS.
- B. Submittals required under this section include, but are not limited to the following:
 - 1. Disconnect switches
 - 2. Enclosure types
 - 3. Transformers
 - 4. Enclosed Circuit Breakers
 - 5. Surge Suppression Devices
 - 6. Wireway
 - 7. Warning tape

8. Nameplates
9. Terminal cabinets and Junction Boxes
10. Meter Socket

1.4 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

PART 2 - PRODUCTS

2.1 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. Enclosures shall meet the area NEMA designation for which they are located.
- C. NEMA Type 12 and 4 enclosures shall be as specified herein.
- D. Disconnect switches shall be as manufactured by Square D Co., Westinghouse Electric Corp., General Electric Co., or equal.

2.2 DISCONNECT SWITCHES (TOGGLE TYPE)

- A. Toggle type disconnect switches shall be quick-make, quick-break with handle guard and lock-off feature.
- B. Switches shall be provided for resistance type and single phase loads. Switches shall not be installed where full load current of utilization equipment exceeds 18 Amperes.
- C. Switches shall be rated 20 Amperes at 600 Volts and 30 Amperes at 250 Volts, 60 Hertz, 2 or 3 pole.
- D. Enclosures shall meet the area NEMA designation for which they are located.
- E. NEMA Type 12 and 4 enclosures shall be as specified herein.
- F. Disconnect switches shall be Square D Co., Class 2510, Type K, equal by Westinghouse Electric Corp., General Electric Company, or equal.

2.3 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. Enclosures shall meet the area NEMA designation for which they are located.
- F. NEMA Type 12 and 4 enclosures shall be as specified herein.

2.4 ENCLOSURES TYPES

- A. NEMA Type 12 enclosure shall be general purpose sheet steel.
- B. NEMA Type 4 enclosures shall be stainless steel, PVC or fiberglass.

2.5 ENCAPSULATED TRANSFORMERS

- A. Encapsulated transformers shall be dry type, copper, two-winding with KVA and voltage ratings as shown on the drawings.
- B. Transformers shall be furnished with full capacity primary voltage taps as follows:
 - 1. 0.25 KVA to 2 KVA - None
 - 2. 3 KVA to 10 KVA - Two - 5 percent below normal.
- C. Transformers shall be designed for extreme environment service with a 316 stainless steel housing and NEMA 4 NEMA 4X.
- D. Transformers shall be designed in accordance with ANSI, IEEE and NEMA standards.
- E. Normal efficiency transformers shall be furnished in sized to 15 KVA. Maximum temperature rise of transformers as measured by resistance above a 40 degree C ambient shall not exceed:
 - 1. 115 degree C for transformers rated up to 10KVA.
- F. All insulating materials shall be in accordance with NEMA standards for a 220 degree C UL component recognized insulation system.
- G. Transformers shall be manufactured by Square D Co., General Electric Co., Hammond Corp., or equal.

2.6 SURGE PROTECTION DEVICE (SPD)

- A. Certify unit listed to UL 1449, 3rd Edition and UL 1283.

- B. SPD shall be UL labeled as Type 1, intended for use without need for external or supplemental overcurrent devices. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal over-temperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- C. SPD to be enclosed, surfaced mount and to include surge counter, audible alarm and dry contact for remote status.
- D. Minimum surge current capability (single pulse rated) per phase shall be 200kA
- E. Voltage Protection Ratings (VPRs) shall not exceed the following:

<u>System Voltage</u>	<u>L-N</u>	<u>L-G</u>	<u>L-L</u>	<u>N-G</u>
208Y/120	700V	700V	1000V	600V
480Y/277	1200V	1200V	2000V	1200V
- F. Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):

<u>System Voltage</u>	<u>Allowable System Voltage Fluctuation (%)</u>	<u>MCOV</u>
208Y/120	25%	150V
480Y/277	15%	320V
- G. 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.

2.7 WIREWAY

- A. Wireway shall be NEMA 12 for interior use only.
- B. NEMA Type 12 enclosures shall be as specified herein.
- C. Wireway shall be “Square Duct” as manufactured by Square D Co., equal by Allen Bradley Co., Cutler Hammer Corp., or equal.

2.8 TERMINAL CABINETS AND JUNCTION BOXES

- A. Enclosures shall meet the area NEMA designation for which they are located.
- B. NEMA Type 12 and 4 enclosures shall be as specified herein.
- C. Provide terminal strips for all terminations.

2.9 POLYETHYLENE WARNING TAPE

- A. Warning tape shall be red polyethylene film, six inch minimum width, Type XB-720 by W.H. Brady Co., or equal.

2.10 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.

2.11 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 5 terminal, 320 Amp continuous rated, self-contained ringless type meter socket with a manual single handled bypass with locking jaw and safety arc shield.

PART 3 - EXECUTION

3.1 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. Devices installed in areas with hung ceilings, in toilet and administrative areas, and in similar areas, shall be installed flush with finished surfaces.
- C. Polyethylene warning tape shall be installed above underground raceways for the entire length of raceway.
- D. All control equipment shall be identified as to the equipment it controls.

END OF SECTION 16085

SECTION 16120

WIRE AND CABLES (Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16120, WIRE AND CABLES is a part of DIVISION 16 - ELECTRICAL, which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. The work of SECTION 16120, WIRE AND CABLES requires the subcontractor to perform all work specified under this section.

1.1 SCOPE

- 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.

1.2 MEASUREMENT AND PAYMENT

- A. Measurement and payment for the work described in this section will be made in accordance with the provisions of SECTION 01025, MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

- A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of DOCUMENT 00700, GENERAL CONDITIONS.
- B. Submittals required under this section include, but are not limited to the following:
 - 1. Wire
 - 2. Cable
 - 3. Terminations
 - 4. Lugs
 - 5. Markers

1.4 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.5 DESIGN CRITERIA

- A. Wire for lighting, single phase circuits shall be Type XHHW or THWN-THHN.
- B. Wire for three phase circuits 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.
- 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.

1.6 MINIMUM SIZES

- A. Except for control and signal leads, no wire smaller than number 12 AWG shall be used.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Wires and cables shall be of annealed, 98 percent conductivity, soft drawn copper.
- B. All conductors No. 12 AWG and larger sizes shall be stranded.

2.2 600 VOLT WIRE

- A. Type XHHW shall be cross-linked polyethylene, as manufactured by Pirelli Cable Corp., Collyer Insulated Wire Co., The Okonite Co. or equal.
- B. Type RHW shall be cross-linked polyethylene, as manufactured by Pirelli Cable Corp., Collyer Insulated Wire Co., The Okonite Co., or equal.
- C. Type THWN/THHN shall be as manufactured by Pirelli Cable Corp., Collyer Insulated Wire Co., The Okonite Co. or equal.

2.3 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.

2.4 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.

2.5 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.

PART 3 - EXECUTION

3.1 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. Multi-conductor cables shall be marked at all terminations.
- D. Lubrications shall be used to facilitate wire pulling. Lubricants shall be U.L. approved for use with the insulation specified.
- E. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.
- F. Shielded instrumentation wire shall be installed in termination and pull boxes that contain only shielded instrumentation wire.

- G. Shielding on instrumentation wire shall be grounded at the transmitter end only.
- H. No more than three lighting circuits, each from a different phase, shall be connected to a common neutral.

3.2 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 16120

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SECTION 16130

RACEWAYS AND FITTINGS (Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16130, RACEWAYS AND FITTINGS is a part of DIVISION 16 - ELECTRICAL which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. The work of SECTION 16130, RACEWAYS AND FITTINGS requires the subcontractor to perform all work specified under this section.

1.1 SCOPE

- 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.

1.2 MEASUREMENT AND PAYMENT

- A. Measurement and payment for the work described in this section will be made in accordance with the provisions of SECTION 01025, MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

- A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of the SECTION 00700, GENERAL CONDITIONS.
- B. Submittals required under this section include, but are not limited to the following:
 - 1. Raceways.
 - 2. Boxes and Fittings.

1.4 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.5 DESIGN CRITERIA

- A. Except where otherwise shown on the drawings, or hereinafter specified, all interior raceways installed exposed shall be PVC Schedule 80.
- B. Rigid heavy wall galvanized steel conduit shall be used for all exposed exterior work and the service pole riser.
- C. PVC Schedule 40 conduit shall be used underground except as specified herein and where otherwise indicated on the drawings.
- D. All conduit of a given type shall be the product of one manufacturer.
- E. Unless otherwise hereinafter specified or shown on the drawings, all boxes shall be metal.
- F. PVC boxes and fittings shall be used with PVC conduit all other boxes shall be metal.
- G. Combination expansion-deflection fittings shall be used where conduits cross structure expansion joints. Refer to Structural drawings for expansion joint locations.
- H. Conduit wall seals shall be used where underground conduits penetrate walls or at other locations shown on the drawings.
- I. Fire stops shall be used where cables or conduits penetrate through fire resistant rated walls, floors, ceilings or partitions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Rigid Conduit
 - 1. PVC conduit, where installed underground shall be rigid polyvinyl chloride Schedule 40 as manufactured by Carlon, Phillips Petroleum Co., Triangle Pipe & Tube Co., Inc., or equal.
 - 2. PVC conduit used in above ground exposed locations shall be rigid polyvinyl chloride Schedule 80 as manufactured by Carlon, Phillips Petroleum Co., Triangle Pipe & Tube Co., Inc., or equal.
 - 3. 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.
- 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.
- C. Flexible couplings shall be as manufactured by Crouse-Hinds Co., Appleton Electric Co., O.Z. Manufacturing Co., or equal.
- D. Boxes and Fittings
1. PVC boxes and fittings shall be as manufactured by Carlon, An Indian Head Co., O.Z. Manufacturing Co., or equal.
 2. Steel elbows and couplings shall be hot-dipped galvanized.
 3. Conduit hubs shall be as manufactured by Myers Electric Products, Inc., Raco Div., O.Z. Manufacturing Co., or equal.
 4. Conduit wall seals shall be Type WSK as manufactured by O.Z. Manufacturing Co., or equal by Link Seal Co.
 5. Combination expansion-deflection fittings shall be Type XD as manufactured by Crouse-Hinds Co., or equal by Appleton Electric Co., O.Z. Manufacturing Co.
 6. Conduit seal bushings shall be Type CSB as manufactured by O.Z. Manufacturing Co., or equal by Crouse-Hinds Co.
 7. Fire stops shall be Type CFSF as manufactured by O.Z. Manufacturing Co., or equal by Crouse-Hinds Co., Appleton Electric Co.
- E. Conduit Mounting Equipment. Hangers, rods, backplates, beam clamps, etc. shall be hot-dipped galvanized iron or steel. Mounting equipment shall be as manufactured by B-Line Co., Thomas and Betts Co., Unistrut Corp., or equal.
- F. Corrosion Protection for Galvanized Conduit. Corrosion protection for galvanized conduit shall be cold galvanized zinc based paint as manufactured by L.P.S. Co., Los Angeles, California, CRS Chemicals, Drecher, Pennsylvania, or equal.

PART 3 - EXECUTION

3.1 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. Multiple runs of conduits shall be supported on trapeze type hangers with steel horizontal members and threaded hanger rods. The rods shall be not less than 3/8 inch diameter. Wire hangers will not be accepted.
- F. Conduit hangers shall be attached to structural steel by means of beam or channel clamps. Where attached to concrete surfaces, concrete inserts of the spot type shall be provided.
- G. All conduits on exposed work and concealed above hung ceilings shall be run at right angles to or parallel with surrounding wall and shall conform to the form of the ceiling. Diagonal runs will not be allowed. Bends in parallel conduit runs shall be concentric. All conduit shall be run perfectly straight and true.
- H. Conduit terminating in pressed steel boxes shall have double locknuts and insulated bushings.
- I. PVC conduits shall be installed using a fusing cement process. Conduits shall be water tight.
- J. Conduit terminating in gasketed enclosures shall be terminated with conduit hubs.
- K. Metallic heavy wall conduits shall be installed using threaded fittings. Threadless fittings may be used in isolated instances when approved by the Engineer.
- L. Liquidtight flexible metal conduit shall be used for all motor terminations and other equipment where vibration is present.
- 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 buildings below grade shall be furnished with a conduit seal bushing.

- O. Ducts installed in concrete slabs shall be installed as specified in SECTION 03300, CAST-IN-PLACE CONCRETE. Ducts shall be arranged to minimize crossings.
- P. Ducts shall not be installed in slabs where the slab is below the highest known groundwater level.
- Q. 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.
- R. A ground wire shall be run in all runs of PVC conduit.
- S. All bends in PVC conduit shall be made using a hotbox and bending guide tool.
- T. 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 16130

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SECTION 16442

PANELBOARDS (Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16442, PANELBOARDS is a part of DIVISION 16 - ELECTRICAL, which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. The work of SECTION 16442, PANELBOARDS requires the subcontractor to perform all work specified under this section.

1.1 SCOPE

- 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 Contract Drawings.

1.2 MEASUREMENT AND PAYMENT

- A. Measurement and payment for the work described in this section will be made in accordance with the provisions of SECTION 01025, MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

- A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of SECTION 00700, GENERAL CONDITIONS.
- B. Submittals required under this section include, but are not limited to the following:
 - 1. Panelboards, including construction details and enclosures.
 - 2. Terminals and lugs
 - 3. Trim
 - 4. Buses
 - 5. Circuit Breakers
 - 6. Groundfault Circuit Interrupter

1.4 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.5 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.
- C. Panelboards used for service entrance shall be Underwriter Laboratories labeled “Suitable for use as service equipment”.

PART 2 - PRODUCTS

2.1 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.

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. Recessed 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.

D. Trim

1. Hinged door-indoor 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. 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. 120/208 Volt and 277/480 Volt three phase distribution panelboards rated for 1200 Amps and less shall be Pow-R-Line 4 type as manufactured by the Cutler

Hammer or equal.

2. 120/240 Volt, single phase, 3 wire, and 120/208 Volt three phase, 4 wire branch circuit panelboards rated for 225 Amps and less shall be Pow-R-Line 1a type as manufactured by the Cutler Hammer or equal.

2.2 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 installed in panelboards shall have an interrupting capacity of not less than the RMS symmetrical panelboard rating as indicated on the drawings.
- D. Main circuit breaker shall be attached to the main vertical bus.
- E. Main breaker shall have solid state digital trip unit with adjustable long, short, and instantaneous trip settings.

2.3 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 (30 milliamp sensitivity, 25 millisecond trip time), and an interrupting capacity matching the circuit breakers in the panelboards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Boxes for surface mounted panelboards shall be mounted so there is at least 1/2 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 16442

SECTION 16495

VARIABLE FREQUENCY DRIVES (Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16495, VARIABLE FREQUENCY DRIVES is a part of DIVISION 16 - ELECTRICAL, which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. The work of SECTION 16445, VARIABLE FREQUENCY DRIVES requires the subcontractor to perform all work specified under this section.

1.1 DESCRIPTION

- A. The work of this section includes furnishing all labor, materials, tools and equipment necessary to furnish and install Variable Frequency Drives (VFD) as shown on drawings, specified herein, or evidently required to complete the work.
- B. Refer to various DIVISION 11 – EQUIPMENT sections and contract drawing motor wiring diagrams for field device interface.

1.2 SUBMITTALS

- A. Shop Drawings and/or brochures shall be submitted to the Engineer in accordance with Section 01300.
- B. Submittals required under this section include, but are not limited to the following:
 - 1. Shop drawings showing complete fabrication and construction details, materials, electrical components, enclosures, input line reactors, harmonic filters, weights, dimensions, clearances, anchorage locations, piping and utility requirements, and step by step sequence of controls.
 - 2. Certified Performance and Efficiency Characteristics.
 - 3. The Contractor shall provide the VFD manufacturer with copies of all motor shop drawing submittals and or nameplate data. The VFD manufacturer shall review this data and shall certify in writing that the equipment has been coordinated with the variable frequency drives and motors for complete compatibility.

4. Harmonic Analysis and written summary report.
5. Complete master wiring diagrams, VFD layout drawings and control schematics, including required coordination with other electrical control devices operating in conjunction with each VFD and suitable outline drawings shall be furnished for each VFD being supplied for approval before proceeding with manufacture. 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.

1.3 DELIVERY, STORAGE AND HANDLING

- A. All materials and equipment shall be shipped, stored, and handled in accordance with Section 01600.
- B. The materials and components shall be stored on a flat, clean surface to prevent damage and shall be covered to prevent exposure to adverse conditions prior to installation.
- C. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.4 DESIGN CRITERIA

- A. The materials and equipment covered by this specification are intended to be standard materials and equipment of demonstrated successful performance, as manufactured by reputable concerns. Equipment shall be designed and constructed in accordance with the highest standards of the industry and shall be installed in accordance with the manufacturer's recommendations and the Contract Documents. The specifications call attention to certain features but do not purport to cover all details entering into the construction of the equipment.
- B. Provide individual constant torque VFD's with LCL line filters, low harmonic drives, and output load filters. Each individual VFD requires all these devices to be factory mounted within its enclosure. Field mounting of drive related accessories is unacceptable.
- C. All equipment submitted shall be provided with enclosures that can be installed in the spaces shown on the drawings. Enclosures that exceed the allowable space provided shall be subject to rejection.
- D. Heat dissipation from VFD enclosures shall meet all requirements of the specifications.

- E. All VFDs shall be passive filtered low harmonic drives for the wastewater and water industry meeting the requirements of IEEE-519 as manufactured by ABB, Eaton or General Electric.
- F. Each VFD unit shall be U.L. listed or labeled.

1.5 HARMONIC REQUIREMENTS

- A. Under normal operating conditions, the line harmonics introduced into the power system from the AC VFD unit(s) shall be within the distortion limits as defined in IEEE 519 and less than %5 Ithd. The point of common coupling shall be the main distribution panel.

PART 2 - PRODUCTS

2.1 DRIVES

- A. This specification is intended to outline the overall physical features, performance and functional requirements of the VFD equipment required under this section, consisting of a variable speed adjustable frequency converter, by-pass contactor, filters, accessories, and enclosure. The VFD system shall be fully tested by the manufacturer before initial startup with all components compatible in function and appearance.
- B. Variable Speed Adjustable Frequency Converter. The adjustable frequency drive shall be UL Listed solid state type in a NEMA 12 filtered enclosure and blower cooled. The filter element shall be of the removable and replaceable type for each drive unit. 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 finish. The drive shall meet applicable provisions of DIVISION 16, ELECTRICAL, the National Electric Code and NEMA. The drive shall be arranged for 480 Volts plus 10 percent to minus 5 percent, three phase, 57 to 63 Hertz input converted into adjustable frequency/Voltage 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. Each individual drive shall be mounted in a separate enclosure. 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. Each individual drive and associated equipment shall be mounted in a single and individual enclosure unless otherwise specified. The following features shall be included with each adjustable frequency drive:
 - 1. Control. The control method shall be sinusoidal Pulse Width Modulation. Output Voltage shall be three phase, 480 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.

2. Function. 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.
3. Protection. 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.
4. Displays. The digital display shall be a 2 line, 40 character unit with readout in plain English. Display shall be located on the door of the VFD enclosure.
5. Internally mounted set point control shall be provided to receive either a 4 to 20 mA dc or 0 to 10 vdc analog input control signal from a process panel to control the speed of the motor. An external digital display shall be provided outside of the inverter. The following control devices shall be available for external control of the inverter; frequency/speed meter, frequency setting variable resistor, knob for frequency setting variable resistor and drive switch. 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%.
6. A bypass motor starter and VFD VFD/Bypass switch shall be provided to allow VFD bypass and straight in line full load motor operation. A solid state bypass soft start style motor starter shall be provided for all motors 10HP and greater. The line and load sides of the soft start motor starter shall be electrically isolated from incoming power and motor respectively with contactors in which will not close until the bypass switch is in the bypass

position.

7. A lockable main load break disconnect switch interlocked with the enclosure door with through the door handle to provide positive disconnect of incoming AC power shall be furnished for each individual drive and enclosure. The circuit breaker shall be rated at a minimum 25,000 amperes at 480 volts, RMS symmetrical.
8. Each drive shall be provided with the following accessories:
 - a. "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.
 - b. Provide a 4-20 mA speed feedback output signal.
 - c. Provide four (4) Type C dry contacts at each VFD for remote indication of motor running status.
 - d. "Hand-Off-Auto" selector switch located on the door of the VFD enclosure. In the "Auto" position the VFD shall be started and stopped remote via an external dry contact. In the "Hand" position the VFD shall run. In "Off" mode the VFD shall not run.
 - e. Elapsed time meters located on the door of the VFD enclosure.
 - f. Provide two (2) type C contacts at each VFD for remote indication of VFD run and fault conditions.
 - g. Motor running indicating light located on the door of the VFD enclosure.
 - h. Motor off indicating light located on the door of the VFD enclosure.
 - i. Drive failure indicating light located on the door of the VFD enclosure.
 - j. Provide a bypass contractor operation indicating light located on the door of the VFD enclosure.
 - k. All indication lights pushbutton shall be push to test type.
 - l. All delay time relays shall be true-off and true-on type delay relays.

- 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 VFD cabinet by the VFD manufacture at the VFD manufacturing plant. Coordinate with the equipment manufacture for space requirements and delivery of the relays.

2.2 OUTPUT LOAD FILTER

- A. VFDs for submersible well pumps shall be provided with output load filters mounted in the VFD cabinet enclosure
- B. The output load filter shall be DV/DT open type rated for the motor horsepower, UL listed, 3 phase, 600-volt class with magnetic steel core inductor, copper windings, metallized polypropylene film capacitors, and wire-wound cement resistors.
- C. The output load filter shall be KDR as manufactured Trans-Coil, Inc., or equal

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

- A. Before the start of the work of this Section, verify that the project is ready for this work.
- B. Verify that field measurements are as shown on approved shop drawings and/or manufacturer's instructions.
- C. Verify that the equipment or material is in conformance with the approved shop drawings and specifications and resolve any deviations.
- D. Notify subcontractors involved or affected by this work and coordinate the work with them.

3.2 INSTALLATION

- A. All materials and equipment shall be installed in a neat, workmanlike manner.
- B. Minimum requirements of all wiring of the equipment shall be as specified under DIVISION 16 -ELECTRICAL of these specifications.
- C. Installation of the equipment shall be in accordance with written instructions provided by the manufacturer and as approved.

3.3 PAINTING

- A. Shop painting and the surface preparation is a part of the work specified herein. Enclosures shall be coated with an electrostatically-applied epoxy enamel.

3.4 CLEAN UP

- A. Prior to start-up and field testing, all foreign matter shall be removed from the equipment. Spillage of lubricants used in servicing the system shall be cleaned from all equipment and concrete surfaces.

3.5 MANUFACTURER'S FIELD SERVICES

- A. Manufacturer's Field Services shall be provided for installation and startup for all the VFDs provided.

3.6 MANUFACTURER'S TRAINING

- A. Manufacturer's training shall be provided for training of Owner's personnel for each type of VFD provided in accordance with Section 01700.
- B. Manufacturer's Field Services shall be a minimum of seven (7) calendar days.
- C. Manufacturer's Training of Owner's Personnel shall be a minimum of two (2) calendar days performed at the project site.

3.7 SPARE PARTS

- A. One set of spare parts shall be provided for each VFD size.
- B. Spare parts for each VFD Size:
 - 1. One (1) control interface.
 - 2. Three (3) fuses.
 - 3. One set of rectifiers.
 - 4. One set of IGBT modules.
 - 5. One set of indicating lamps.

3.8 WARRANTY

- A. A manufacturer's warranty for three years shall be provided for each VFD.

END OF SECTION 16495

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SECTION 16500

LIGHTING SYSTEM (Filed Subbid Required)

PART 1 - GENERAL

1.0 SUBBID REQUIREMENTS

- A. The work of SECTION 16500, LIGHTING SYSTEM is a part of DIVISION 16 - ELECTRICAL, which requires a single filed subbid in accordance with MGL c.149, s.44A through 44H, inclusive, as amended.
- B. The work of SECTION 16500, LIGHTING SYSTEM requires the subcontractor to perform all work specified under this section.

1.1 SCOPE

- 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.

1.2 MEASUREMENT AND PAYMENT

- A. Measurement and payment for the work described in this section will be made in accordance with the provisions of SECTION 01025, MEASUREMENT AND PAYMENT.

1.3 SUBMITTALS

- A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of SECTION 00700, GENERAL CONDITIONS.
- B. Submittals required under this section include, but are not limited to the following:
 - 1. Light Switches
 - 2. Receptacles
 - 3. Lighting Fixtures
 - 4. Device Plates
 - 5. Emergency Lighting Battery Units

1.4 PRODUCT HANDLING

- A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.5 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

2.1 WIRE

- A. Wire shall be as specified under SECTION 16120, WIRE AND CABLES.

2.2 CONDUIT

- A. Conduit shall be as specified under SECTION 16130, RACEWAYS AND FITTINGS.

2.3 PANELBOARDS

- A. Panelboards shall be as specified under SECTION 16442 PANELBOARDS.

2.4 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.
- E. U.L. and CSA Listed.

2.5 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.

2.6 DEVICE PLATES

- A. Plates 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.

2.7 LED LIGHT FIXTURES

- A. The fixture shall be tested to IESNA LM-79-08 and LM-80 Testing Standards at 25° C ambient temperature
- B. 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.
- C. 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
- D. 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).

2.8 EMERGENCY LIGHTING BATTERY UNITS

- A. Emergency lighting units shall be fully automatic with 12 Volt lead acid batteries. The wattage of the unit shall be sufficient to power the remote lamps as shown on the Contract Drawings, plus 20% spare capacity, for 1-1/2 hour upon loss of AC power. Units shall be designed for 120 Volt, 60 Hertz input and have an automatic clock timer and solid state charger, ready/off switch, press-to-test switch, amber "ready" light, red "charge" light and required number of supervisory relays.
- B. Provide Holophane DeSoto M802 series emergency lighting units. Units manufactured by Hubbell, Dual Lite or approved equal are also acceptable. Remote heads shall LR Lexan sealed beam, 12 volts, 8 watts, halogen type with weatherproof mounting base by Holophane.

PART 3 - EXECUTION

3.1 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.
- B. When fixtures are noted to be installed flush, they shall be complete with the proper

accessories for installing in the particular ceiling involved. All flush mounted fixtures shall be supported from the structure and shall not be dependent on the hung ceilings for their support.

- C. Flexible fixture hangers shall be used for all pendant mounted fixtures. Pendant mounted fixtures shall be supported from 1 inch galvanized rigid steel conduit.
- D. Receptacles and switches shall be mounted at 45” above finished floor.
- E. Mounting heights given are to the bottom of the fixture. When “mount up” is indicated, fixture is to be mounted the stated distance off the finished floor.






3.2 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 16500

APPENDIX A
TEST WELL LOGS

Kleinfelder 4 Technology Drive Westborough, Massachusetts		PROJECT Salem Street Wellfield Wilmington, Massachusetts		BORING NUMBER		TW1-19			
				SHEET DATE	1 11/14/19	OF FILE	2		
BORING COMPANY		Maher Services		SITE GROUND ELEVATION CASING ELEVATION		Salem Street Wellfield			
FOREMAN		J. Maher							
GEOLOGIST		M. Callahan		DATE STARTED		Stick Up 2.85 feet			
						DATE ENDED		11/14/19	
DRILLING			WELL INFORMATION						
TYPE	Geoprobe	Well	PVC Diameter	Screen Interval	Slot Size	Well Depth	Depth to Water (TOC)	DTW BGS (Ft)	Date
CASING DIAMETER	3"	TW1-19	2"	37-32'	60	37'	5.15	2.35	1/15/20
SAMPLE INTERVAL	RECOVERY	SAMPLE DESCRIPTION			STRATA CHANGE		2.0" WELL		
0 – 5'	4.5'	Dark brown topsoil over tan VF-F SAND, so. silt			Tan VF-F SAND, so. silt				
5 – 10'	5'	Light tan, some orange streaking, VF-F SAND, so. silt							
10 – 15'	4.5'	Tan layers of VF-F SAND, li. silt with orange M-C SAND with pockets of silt.							
15 – 20'	4'	Tan with orange streaking, VF-F SAND, li. silt with a few layers of M-C SAND (MICA)							
20 – 25'	4.5'	Light tan/light gray layers of VF-F SAND, so. silt, 4" layer of silt over F SAND, li. silt, trace med. sand			Light tan/gray F-C SAND & GRAVEL				
25 – 30'	3'	Light tan/light gray, F-C SAND & F GRAVEL, tr. silt (MICA)							
30 – 35'	2'	Light gray F-C SAND & F GRAVEL, tr. silt over Tan/orange F-C SAND & F GRAVEL, tr. silt (MICA)							
35 – 40'	3'	Light brown/orange F-C SAND, li. gravel. sand, tr. silt (MICA) over light gray F SAND, li. silt			Light gray VF-F SAND, li. silt				
40 - 45'	4'	Light gray VF-F SAND, li. silt							
		END OF BORING Screened 37 – 32', 60-slot stainless steel screen							

PROPORTIONS USED		WELL CONSTRUCTION LEGEND					
TRACE	0 TO 10%	WELL SCREEN 	SILICA SAND		NATURAL BACKFILL 	GROUT	
LITTLE	10 TO 20%		BEDROCK				
SOME	20 TO 35%						
AND	35 TO 50%						

Kleinfelder 4 Technology Drive Westborough, Massachusetts		PROJECT Salem Street Wellfield Wilmington, Massachusetts		BORING NUMBER TW3-19		SHEET 1		OF 1	
BORING COMPANY		Maher Services		SITE		Salem Street Wellfield			
FOREMAN		J. Maher		GROUND ELEVATION					
GEOLOGIST		M. Callahan		CASING ELEVATION		Stick Up		3.5 feet	
				DATE STARTED		11/19/19		DATE ENDED 11/19/19	
DRILLING			WELL INFORMATION						
TYPE	Geoprobe	Well	PVC Diameter	Screen Interval (Stainless Steel)	Slot Size	Well Depth	Depth to Water (TOC)	DTW BGS (Ft)	Date
CASING DIAMETER	3"	TW3-19	2"	41.5-36.5'	60	41.5'	6.0	2.5	1/15/20
SAMPLE INTERVAL	RECOVERY	SAMPLE DESCRIPTION			STRATA CHANGE		2.0" WELL		
0 – 5'	4.5'	Dark brown topsoil over light brown VF-F SAND, so. silt			VF-F SAND, so. silt				
5 – 10'	5'	Light tan, VF-F SAND, so. silt							
10 – 15'	5'	Tan F SAND, so. silt over F SAND AND SILT (fining downward)							
15 – 20'	4'	Tan F SAND AND SILT over VF-F SAND, so. silt							
20 – 25'	2'	Light brown F-C SAND AND GRAVEL over Gray VF-F SAND, so. silt			F-C SAND with layers of VF-F SAND				
25 – 30'	3'	Gray F SAND, li. silt with 2" layer of mica over Gray with orange F-C SAND, tr. silt (compact, poorly sorted)			F-C SAND AND GRAVEL				
30 – 35'	2'	Gray F-C SAND AND GRAVEL (compact, poorly sorted)							
35 – 40'	1.5'	Gray F-C SAND AND GRAVEL (compact, poorly sorted)							
40 - 45'	2.5'	Light brown F-C SAND AND GRAVEL, tr. silt over Gray F-C SAND, tr. silt			F-C SAND				
				END OF BORING Screened 41.5 to 36.5, 60-slot stainless steel screen					
PROPORTIONS USED				WELL CONSTRUCTION LEGEND					
TRACE	0 TO 10%	WELL SCREEN		SILICA SAND		NATURAL BACKFILL		GROUT	
LITTLE	10 TO 20%			BEDROCK					
SOME	20 TO 35%								
AND	35 TO 50%								

Kleinfelder 4 Technology Drive Westborough, Massachusetts		PROJECT Salem Street Wellfield Wilmington, Massachusetts		BORING NUMBER		TW6-20			
				SHEET	1	OF	2		
BORING COMPANY		Maher Services		SITE GROUND ELEVATION		Salem Street Wellfield			
FOREMAN		J. Maher							
GEOLOGIST		M. Callahan		CASING ELEVATION		Stick Up	3.3 feet		
				DATE STARTED		1/10/2020	DATE ENDED	1/10/2020	
DRILLING			WELL INFORMATION						
TYPE	Geoprobe	Well	PVC Diameter	Screen Interval	Slot Size	Well Depth	Depth to Water (TOC)	DTW BGS (Ft)	Date
CASING DIAMETER	3"	TW6-20	2"	42 - 37'	60	42'	6.0	2.19	1/15/20
SAMPLE INTERVAL	RECOVERY	SAMPLE DESCRIPTION			STRATA CHANGE		2.0" WELL		
0 - 5'	4.5'	Dark brown topsoil over light gray VF-F SAND, tr. silt			Tan VF-F SAND, so. silt				
5 - 10'	5'	Light gray VF-F SAND, li. silt							
10 - 15'	2'	Light brown F SAND, li. silt over F-C SAND AND GRAVEL, tr. silt							
15 - 20'	0, 2.5'	NO SAMPLE, pulled back and resampled. Light gray F SAND, tr. silt							
20 - 25'	0, 2'	NO SAMPLE, pulled back and resampled. Light gray F SAND, tr. m. sand and silt							
25 - 30'	2.5'	Light gray F SAND, tr. m. sand and silt over light brown F - C SAND, tr. silt							
30 - 35'	2.5'	Light brown F-C SAND, tr. silt							
35 - 40'	3'	Light brown F-C SAND							
40 - 45'	4'	Brown/orange F_C SAND, li. gravel over 8-inches of light gray F SAND, li. silt							
		END OF BORING Screened 42 - 37', 60-slot stainless steel screen			Light gray F SAND				

PROPORTIONS USED		WELL CONSTRUCTION LEGEND					
TRACE	0 TO 10%	WELL SCREEN 	SILICA SAND		NATURAL BACKFILL 	GROUT	
LITTLE	10 TO 20%		BEDROCK				
SOME	20 TO 35%						
AND	35 TO 50%						

Kleinfelder 4 Technology Drive Westborough, Massachusetts		PROJECT Salem Street Wellfield Wilmington, Massachusetts		BORING NUMBER TW7-20					
				SHEET 1		OF 2			
				DATE 1/13/2020		FILE			
BORING COMPANY		Maher Services		SITE		Salem Street Wellfield			
FOREMAN		J. Maher		GROUND ELEVATION					
GEOLOGIST		M. Callahan		CASING ELEVATION				Stick Up 3.1 feet	
				DATE STARTED		1/13/2020		DATE ENDED 1/13/2020	
DRILLING			WELL INFORMATION						
TYPE	Geoprobe	Well	PVC Diameter	Screen Interval	Slot Size	Well Depth	Depth to Water (TOC)	DTW BGS (Ft)	Date
CASING DIAMETER	3"	TW7-20	2"	42 - 37'	60	42'	5.36	2.5	1/14/20
SAMPLE INTERVAL	RECOVERY	SAMPLE DESCRIPTION			STRATA CHANGE		2.0" WELL		
0 - 5'	5'	Dark brown topsoil over light brown F-M SAND and F SAND, tr. silt			F SAND				
5 - 10'	5'	Light gray F SAND, li. silt over VF-F SAND AND SILT			VF-F SAND, so. silt				
10 - 15'	5'	Light brown to gray VF-F SAND, li. silt, tr. clay							
15 - 20'	1.5'	Gray SAND AND GRAVEL			F-C SAND AND GRAVEL				
20 - 25'	3.5'	Gray F-C SAND AND GRAVEL over F SAND AND SILT							
25 - 30'	3'	Gray VF-F SAND, tr. silt			VF-F SAND, li. silt				
30 - 35'	2.5'	Light gray F-M SAND, tr. silt over light brown F-C SAND			F-C SAND				
35 - 40'	3'	Light brown F-C SAND over F-C SAND AND GRAVEL			SAND AND GRAVEL				
40 - 45'	2.5'	Light brown/orange F-C SAND AND GRAVEL over light brown to gray F-M SAND							
45 - 50'	4'	Gray VF-F SAND, li. silt			VF-F SAND, li. silt				
		END OF BORING Screened 42 - 37', 60-slot stainless steel screen							

PROPORTIONS USED		WELL CONSTRUCTION LEGEND			
TRACE 0 TO 10%		WELL SCREEN		SILICA SAND	
LITTLE 10 TO 20%				NATURAL BACKFILL	
SOME 20 TO 35%				GROUT	
AND 35 TO 50%				BEDROCK	

Kleinfelder 4 Technology Drive Westborough, Massachusetts		PROJECT Salem Street Wellfield Wilmington, Massachusetts		BORING NUMBER		BORING 5-19			
				SHEET DATE	1 11/20/19	OF FILE	1 1		
BORING COMPANY		Maher Services		SITE GROUND ELEVATION CASING ELEVATION		Salem Street Wellfield			
FOREMAN		J. Maher				Stick Up DATE ENDED		11/20/19	
GEOLOGIST		A. Bishop		DATE STARTED				11/20/19	
DRILLING		WELL INFORMATION							
TYPE	Geoprobe	Well	PVC Diameter	Screen Interval (PVC)	Slot Size	Well Depth	Depth to Water (TOC)	Depth to Water (PVC)	Date
CASING DIAMETER	3"	No Well							
SAMPLE INTERVAL	RECOVERY	SAMPLE DESCRIPTION			STRATA CHANGE		2.0" WELL		
0 – 5'	4.5'	Dark brown topsoil over light brown F SAND over F-C SAND, so. silt			VF-F SAND, so. silt				
5 – 10'	4'	Light tan F SAND, so. silt over Light gray F SAND, so. silt (MICA)							
10 – 15'	5'	Light gray VF-F SAND, so. silt over grayish green F SAND with silt and clay							
15 – 20'	3'	*Driller broke rod and needed to resample. Light brown, F-M SAND, tr. silt over Light gray F SAND, so. silt			Layers of F to F-M SAND, li. silt				
20 – 25'	2'	Light gray VF-F SAND, li. silt (MICA) over F-C SAND AND GRAVEL, li. silt			Light gray VF-F SAND				
					F-C SAND AND GRAVEL				
25 – 30'	1'	Light gray F SAND, so. m. sand, tr. silt (Tough drilling)			F SAND				
		END OF BORING							

PROPORTIONS USED		WELL CONSTRUCTION LEGEND			
TRACE 0 TO 10%	WELL SCREEN	SILICA SAND	NATURAL BACKFILL	GROUT	=====
LITTLE 10 TO 20%				BEDROCK	++++++
SOME 20 TO 35%					
AND 35 TO 50%					

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APPENDIX B
ORDER OF CONDITIONS



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 344-1476
 MassDEP File # _____
 eDEP Transaction # _____
 Wilmington
 City/Town

A. General Information

Please note:
 this form has
 been modified
 with added
 space to
 accommodate
 the Registry
 of Deeds
 Requirements

Important:
 When filling
 out forms on
 the
 computer,
 use only the
 tab key to
 move your
 cursor - do
 not use the
 return key.



1. From: Wilmington
 Conservation Commission

2. This issuance is for (check one):
 a. Order of Conditions b. Amended Order of Conditions

3. To: Applicant:
Michael Woods
 a. First Name b. Last Name
Town of Wilmington, Department of Public Works
 c. Organization
121 Glen Road
 d. Mailing Address
Wilmington MA 01887
 e. City/Town f. State g. Zip Code

4. Property Owner (if different from applicant):

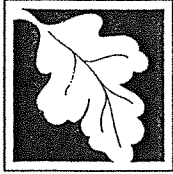
 a. First Name b. Last Name

 c. Organization

 d. Mailing Address

 e. City/Town f. State g. Zip Code

5. Project Location:
Salem Street - Rear Wilmington
 a. Street Address b. City/Town
101 Lots 3 & 5
 c. Assessors Map/Plat Number d. Parcel/Lot Number
 Latitude and Longitude, if known: 42° 34' 42.8" 071° 07' 59.2"
 d. Latitude e. Longitude



Massachusetts Department of Environmental Protection
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A. General Information (cont.)

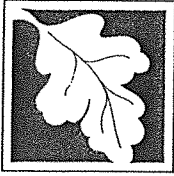
6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):
Middlesex North
 a. County 1695 & 1665 b. Certificate Number (if registered land) 140 & 203
 c. Book _____ d. Page _____
7. Dates: April 21, 2021 June 2, 2021 June 9, 2021
 a. Date Notice of Intent Filed b. Date Public Hearing Closed c. Date of Issuance
8. Final Approved Plans and Other Documents (attach additional plan or document references as needed): **See attached list**
- a. Plan Title _____
- b. Prepared By _____ c. Signed and Stamped by _____
- d. Final Revision Date _____ e. Scale _____
- f. Additional Plan or Document Title _____ g. Date _____

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:
 Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:
- a. Public Water Supply b. Land Containing Shellfish c. Prevention of Pollution
 d. Private Water Supply e. Fisheries f. Protection of Wildlife Habitat
 g. Groundwater Supply h. Storm Damage Prevention i. Flood Control
2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

- a. the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.



Massachusetts Department of Environmental Protection
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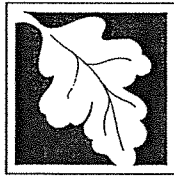
B. Findings (cont.)

Denied because:

- b. the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**
- c. the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**
3. Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) 5
 a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. <input type="checkbox"/> Bank	a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. <input type="checkbox"/> Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. <input type="checkbox"/> Land Under Waterbodies and Waterways	a. square feet	b. square feet	c. square feet	d. square feet
	e. c/y dredged	f. c/y dredged		
7. <input checked="" type="checkbox"/> Bordering Land Subject to Flooding	<u>8170 (temp)</u> a. square feet	<u>8170 (temp)</u> b. square feet	c. square feet	d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. <input type="checkbox"/> Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. <input checked="" type="checkbox"/> Riverfront Area	<u>7240 (temp)</u> <u>930 (perm)</u> a. total sq. feet	<u>7240 (temp)</u> <u>930 (perm)</u> b. total sq. feet		
Sq ft within 100 ft	<u>7240 (temp)</u> <u>930 (perm)</u> c. square feet	<u>7240 (temp)</u> <u>930 (perm)</u> d. square feet	<u>950</u> e. square feet	<u>950</u> f. square feet
Sq ft between 100-200 ft	<u> </u> n. square feet	<u> </u> h. square feet	<u> </u> i. square feet	<u> </u> j. square feet

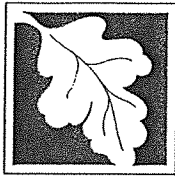


WPA Form 5 – Order of Conditions

B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. <input type="checkbox"/> Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. <input type="checkbox"/> Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. <input type="checkbox"/> Coastal Beaches	a. square feet	b. square feet	c. $\frac{\text{cu yd}}{\text{nourishment}}$	d. $\frac{\text{cu yd}}{\text{nourishment}}$
14. <input type="checkbox"/> Coastal Dunes	a. square feet	b. square feet	c. $\frac{\text{cu yd}}{\text{nourishment}}$	d. $\frac{\text{cu yd}}{\text{nourishment}}$
15. <input type="checkbox"/> Coastal Banks	a. linear feet	b. linear feet		
16. <input type="checkbox"/> Rocky Intertidal Shores	a. square feet	b. square feet		
17. <input type="checkbox"/> Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. <input type="checkbox"/> Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. <input type="checkbox"/> Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. <input type="checkbox"/> Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet



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B. Findings (cont.)

* #22. If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

22. Restoration/Enhancement *:

a. square feet of BVW

b. square feet of salt marsh

23. Stream Crossing(s):

a. number of new stream crossings

b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
 - a. The work is a maintenance dredging project as provided for in the Act; or
 - b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
 - c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on _____ unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.



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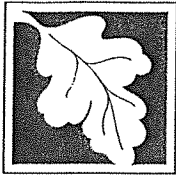
Wilmington

City/Town

C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.
9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.
10. A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]
"File Number 344-1476 "
11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.
12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.
13. The work shall conform to the plans and special conditions referenced in this order.
14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.
15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.
16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.



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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.
19. The work associated with this Order (the "Project")
 - (1) is subject to the Massachusetts Stormwater Standards
 - (2) is NOT subject to the Massachusetts Stormwater Standards

If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

- a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.
- b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
 - i.* all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
 - ii.* as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
 - iii.* any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;



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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement") for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

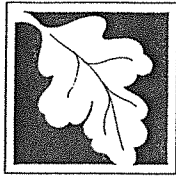
i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.



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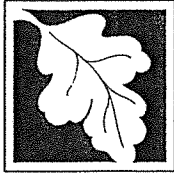
C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

- g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
 2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
 3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.
- h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.
- i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.
- j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.
- k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.
- l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):

See attached conditions

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.



D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? Yes No
2. The _____ hereby finds (check one that applies):
 Conservation Commission
- a. that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

1. Municipal Ordinance or Bylaw _____ 2. Citation _____

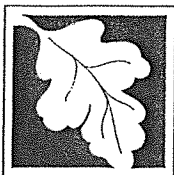
Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

- b. that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

1. Municipal Ordinance or Bylaw _____ 2. Citation _____

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):



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E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

Please indicate the number of members who will sign this form.

This Order must be signed by a majority of the Conservation Commission.

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

June 9, 2021
 1. Date of Issuance

4
 2. Number of Signers

Signatures:

Laura T. deWahl

Laura T. deWahl

Donald Pearson

Donald Pearson

Vincent Licciardi

Vincent Licciardi

by hand delivery on

June 2, 2021
 Date

 Alexander M. Rittershaus

 Michael McInnis

 Thomas A. Ollila

Theron R. Bradley
 Theron R. Bradley

by certified mail, return receipt requested, on

 Date

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request of Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

ORDER OF CONDITIONS

#344-1477

Salem Street - Rear

Map 101, Parcels 3 & 5

Michael Woods, Town of Wilmington Department of Public Works

Project: Construction of three (3) 18" x 24" diameter wells and the instillation of 6" diameter ductile iron piping to deliver raw water from the new wells to the existing water mains. The work proposed is located within the 100-foot buffer zone to Bordering Vegetated Wetlands (BVWs), 100-foot Riverfront Area, and Bordering Land Subject to Flooding. The limit of work includes a total of 8,170 SF within the 100-foot buffer zone to Bordering Vegetated Wetlands (BVWs), 100-foot Riverfront Area, and Bordering Land Subject to Flooding, of which 7,240 SF will be temporary. The remaining 930 SF will be enclosed with chain link fence and seeded as lawn to provide maintenance to the new well. The project includes the restoration of 950 SF of 100-foot Riverfront Area with plantings and seeding. No changes to Bordering Land Subject to Flooding are proposed. This is a limited project in accordance with 310 CMR 10.53(3).

SPECIAL CONDITIONS:

General:

(Please review the General Conditions on previous pages)

21. The work shall conform to the following plans and documents, unless otherwise specified in this Order of Conditions (Order):

- a) Notice of Intent (NOI) filed by Michael Woods, Town of Wilmington Department of Public Works, dated April 2021, and received by the Conservation Commission (Commission) on April 21, 2021, revised page 3 received on May 24, 2021.
- b) Plan set entitled "Proposed Site Plan, Town of Wilmington, Massachusetts Salem Street Wellfield Replacement", dated May 2021 and sheets C-1 and C-2 revised May 18, 2021, prepared by Kleinfelder, stamped by Felipe S. Contreras, Registered Professional Engineer (PE).
- c) Technical Memorandum prepared by Kirsten Ryan, Kleinfelder, and dated May 19, 2021.

22. The approved plan in Condition 21b shall be revised to provide additional plantings (at least 5 additional bayberry and at least 5 additional sweet fern) and substitute one Northern Red Oak and one White Pine for two of the proposed Gray Birch. The revised plan shall be submitted to the Department of Planning & Conservation for review and approval prior to construction.

23. The proposed work is within Riverfront Area, Bordering Land Subject to Flooding and the 100 foot buffer zone to BVWs. No other wetland resource areas are proposed to be, or permitted to be, altered under this Order.

24. The Commission reserves the right to impose additional conditions on this project to mitigate any actual or potential impacts resulting from the work herein permitted.

25. With respect to all conditions, the Commission designates the Conservation Agent as its administrative agent with full powers to act on its behalf in administering and enforcing this Order.

26. The Plans of Record for this Order do not constitute specific acceptance of the boundaries of resource areas for any work not described in the corresponding NOI, as amended prior to approval. For any such work not described as per the provisions above, the Commission may require new plans and/or delineation of wetland resource areas, as it deems appropriate.
27. This document and the approved plans shall be included in all construction contracts and subcontracts for the proposed work and shall supersede any conflicting contract requirements. It shall also be kept on file at the job site at all times during construction. Any contractors or subcontractors may be held jointly liable for any violation of this Order.
28. The owners of the project and any successor in control or in interest of the property, in the event they proceed to alter areas subject to the Commission's jurisdiction under the Order, agree that the Town of Wilmington shall not be liable for any damage. By acceptance of this Order, the owners indemnify and hold harmless the Town of Wilmington and its residents for any damages attributable to alterations undertaken on this property pursuant to this Order. Issuance of this Order does not in any way imply or certify that the site or downstream areas will not be subject to flooding, storm damage or any other form of water damage.

Pre-Construction:

29. Prior to the commencement of any work on site, the Applicant shall submit to the Commission for approval the anticipated sequence of construction and timetable. The Applicant shall include the name(s), address(es), e-mail address(es), and telephone number(s) of the person(s) responsible on site for compliance with this Order.
30. Prior to the start of any work, and in compliance with Condition 10, a sign shall be displayed showing the DEP File Number. This sign shall not be posted on a live tree. It shall be maintained until a Certificate of Compliance (Certificate) is issued.
31. Prior to any activity on the site, a compost-filled sock, straw wattle, siltation fence, or other erosion controls approved by the Commission shall be placed as depicted on the approved plan. The erosion controls shall act as the limit of work. The erosion control barrier shall be placed and properly installed per manufacturer's specifications, maintained according to the approved plan, and shall be inspected and approved by the Conservation Agent prior to the start of construction. This barrier shall remain intact and immediately repaired as necessary until all disturbed areas have been permanently stabilized to prevent erosion.
32. Prior to any work, the Applicant and/or their agents shall meet with the Conservation Agent on the site to review the proposed work, erosion controls, and measures designed to mitigate any impact to wetland resource areas, and to ensure that all of the conditions of this Order are understood.

Construction:

33. At the beginning of each month in which construction activity occurs on site and for as long thereafter as the ground remains unstabilized, the Applicant shall submit a report to the Commission, certifying that, to the best of their knowledge based on a site inspection, all work is being performed in compliance to the plan and these conditions. This report shall detail work, which has been done in wetland resource areas, and what work is anticipated over the next period.
34. Preparation and planting of the Riverfront restoration area shall be overseen by a wetland scientist. The wetland scientist shall be on site while the restoration work is conducted and

shall be responsible for overseeing activities including, but not limited to: inspecting and confirming erosion controls; identifying the appropriate organic soils to be placed in the restoration area; overseeing final grading to ensure no loss of BLSF; obtaining, planting and maintaining the specified plants and seed mixes; and monitoring and reporting on the restoration area for two (2) years of full continuous growing seasons.

35. Grading shall not direct runoff to the property of others. This project shall not increase the rate of runoff, nor cause flood or storm damage, to abutters or the property of others.
36. No proposed earthen embankment in wetland resource areas shall have a slope steeper than 2:1 (horizontal: vertical) without prior written approval of the Commission.
37. There shall be no stockpiling of any soil or other materials within 25 feet of Bank or BVWs without prior written approval of the Conservation Commission.
38. Any dewatering activities on the project shall make use of a settling pond or similar device to remove sediment before water is released. This system must be approved by the Conservation Agent prior to implementation. There shall be no direct discharge of water to BVWs, the perennial river, or catch basins.
39. Equipment fuel storage and refueling operations shall be situated in an upland area at a horizontal distance greater than 100 feet from BVWs and Bank.
40. All stumps, brush, waste and debris shall be removed from the construction site, including existing debris. Construction refuse and debris shall be disposed of promptly and properly and the construction site shall be maintained in a clean condition. Records as to the destination of all materials to be removed from the site including stumps, brush, waste, debris, excess fill, loam and peat shall be kept and supplied to the Commission if requested.
41. All disturbed areas shall be permanently stabilized by vegetation or as otherwise shown on the above-referenced plans, within 30 days of final grading for this project. If permanent vegetative stabilization is not possible due to snow or frozen conditions outside of the growing season, temporary stabilization shall be provided, and permanent stabilization shall be achieved as soon as possible. Once the ground is permanently stabilized, all erosion controls shall be removed prior to issuance of a Certificate.
42. If any unforeseen problem occurs during construction, which affects any of the eight statutory interests of the Wetlands Protection Act (WPA), upon discovery, the Applicant shall notify the Conservation Agent immediately and a meeting shall be held with the Applicant and any other concerned parties to determine the corrective measures to be employed. The Applicant shall then correct the problem(s) using the agreed upon corrective measures or any other measures as determined by the Commission.

Post Construction:

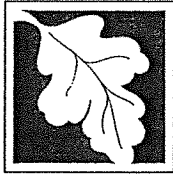
43. The wetland scientist shall monitor the restoration area for two (2) years of full continuous growing seasons, with written reports submitted annually by October 31st of each successive calendar year.
44. Monitoring reports shall incorporate photographic stations for "before" and "after" photographic documentation. All monitoring reports shall clearly and comprehensively describe the site conditions and restoration conditions, including, but not limited to, the stability, health, growth and vigor of the planted species, wildlife habitat, and any enhancement activities performed or remedial actions necessary to be undertaken for restoration success to ensure that the Riverfront Area is functionally restored to pre-altered

conditions.

45. Upon completion of this project, but no more than 30 days after expiration of the Order, the Applicant or their representative is responsible for submitting the Request for a Certificate of Compliance. Completion means all construction and site work is finished per this Order, and permanent stabilization is achieved. The following is to be submitted to the Commission to receive a Certificate:
 - a) A Request for a Certificate of Compliance (DEP WPA form 8A).
 - b) An as-built topographic plan, at the same scale as the approved plan, signed and stamped by a PE or Land Surveyor (PLS) of the Commonwealth. The as-built shall show and label all grading, construction, wetland resource area locations, the 100' buffer zone, and 15-foot and 25-foot setbacks.
 - c) A written statement from a PE or PLS of the Commonwealth certifying that the work has been completed in compliance with this Order and the approved plans referenced herein (or approved revisions). Any discrepancies shall be noted.

Ongoing Conditions:

46. Ongoing special conditions shall extend beyond the issuance of a Certificate.
47. No rock salt (sodium chloride) shall be used on the paved roadway surface within Riverfront Area, except as required for public safety and when another material would not suffice. Signs indicating low or reduced salt use shall be posted at the edge of the Riverfront Area.
48. The Conservation Commission shall be notified in writing when any maintenance functions that may impact wetlands are to be performed.



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 344-1476
 MassDEP File #

eDEP Transaction #
 Wilmington
 City/Town

G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Wilmington

Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Conservation Commission

Please be advised that the Order of Conditions for the Project at:

Project Location

MassDEP File Number

Has been recorded at the Registry of Deeds of:

County

Book

Page

for:

Property Owner

and has been noted in the chain of title of the affected property in:

Book

Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

APPENDIX C

DCAMM PRIME/GENERAL UPDATE STATEMENT

**PRIME/GENERAL UPDATE STATEMENTS ARE NOT PUBLIC RECORDS AND
ARE NOT OPEN TO PUBLIC INSPECTION (M.G.L. C.149, §44D)**

TO ALL BIDDERS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED PRIME/GENERAL CONTRACTOR UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY PRIME/GENERAL BID FOR A CONTRACT PURSUANT TO M.G.L. c.149, §44A AND M.G.L. c. 149A. ANY PRIME/GENERAL BID SUBMITTED WITHOUT AN APPROPRIATE UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

Caution: This form is to be used for submitting Prime/General Contract bids. It is not to be used for submitting Filed Sub-Bids or Trade Sub-Bids.

AWARDING AUTHORITIES

If the Awarding Authority determines that the bidder does not demonstrably possess the skill, ability and integrity necessary to perform the work on the project, it must reject the bid.

BIDDER'S AFFIDAVIT

I swear under the pains and penalties of perjury that I am duly authorized by the bidder named below to sign and submit this Prime/General Contractor Update Statement on behalf of the bidder named below, that I have read this Prime/General Contractor Update Statement, and that all of the information provided by the bidder in this Prime/General Contractor Update Statement is true, accurate, and complete as of the bid date.

Bid Date	Print Name of Prime/General Contractor
Project Number (or name if no number)	Business Address
Awarding Authority	Telephone Number

SIGNATURE⇒

Bidder's Authorized Representative

INSTRUCTIONS

INSTRUCTIONS TO BIDDERS

- This form must be completed and submitted by all Prime/General contractors bidding on projects pursuant to M.G.L. c. 149, §44A and M.G.L. c. 149A.
- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- **This Update Statement must include all requested information that was not previously reported on the Application used for your firm's most recently issued (not extended or amended) Prime/General Contractor Certificate of Eligibility. The Update Statement must cover the entire period since the date of your Application, NOT since the date of your Certification.**
- You must use this official form of Update Statement. Copies of this form may be obtained from the awarding authority and from the Asset Management Web Site: www.mass.gov/dcam .
- If additional space is needed, please copy the appropriate page of this Update Statement and attach it as an additional sheet.
- See the section entitled "Bidding Limits" in the *Instructions to Awarding Authorities* for important information concerning your bidding limits.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Bidder Qualifications

- It is the awarding authority's responsibility to determine who is the lowest eligible and responsible bidder. You must consider all of the information in the low bidder's Update Statement in making this determination. Remember: this information was not available to the Division of Capital Asset Management and Maintenance at the time of certification.
- The bidder's performance on the projects listed in Parts 1 and 2 must be part of your review. Contact the project references.
- AWARDING AUTHORITIES ARE STRONGLY ENCOURAGED TO REVIEW THE LOW BIDDER'S

ENTIRE CERTIFICATION FILE AT THE DIVISION OF CAPITAL ASSET MANAGEMENT AND MAINTENANCE. Telephone (617) 727-9320 for an appointment.

Bidding Limits

Single Project Limit: The total amount of the bid, including all alternates, may not exceed the bidder's Single Project Limit.

Aggregate Work Limit: The annual value of the work to be performed on the contract for which the bid is submitted, when added to the annual cost to complete the bidder's other currently held contracts, may not exceed the bidder's Aggregate Work Limit. Use the following procedure to determine whether the low bidder is within its Aggregate Work Limit:

Step 1 Review Update Statement Question #2 to make sure that all requested information is provided and that the bidder has accurately calculated and totaled the annualized value of all incomplete work on its currently held contracts (column 9).

Step 2 Determine the annual dollar value of the work to be performed on your project. This is done as follows:

(i) If the project is to be completed in less than 12 months, the annual dollar value of the work is equal to the full amount of the bid.

(ii) If the project will take more than 12 months to complete, calculate the number of years given to complete the project by dividing the total number of months in the project schedule by 12 (calculate to 3 decimal places), then divide the amount of the bid by the calculated number of years to find the annual dollar value of the work.

Step 3 Add the annualized value of all of the bidder's incomplete contract work (the

total of column 9 on page 5) to the annual dollar value of the work to be performed on your project. **The total may not exceed the bidder's Aggregate Work Limit.**

Correction of Errors and Omissions in Update Statements

Matters of Form: An awarding authority shall not reject a contractor's bid because there are mistakes or omissions of form in the Update Statement submitted with the bid, provided the contractor promptly

corrects those mistakes or omissions upon request of the awarding authority. [810 CMR 8.05(1)].

Correction of Other Defects: An awarding authority may, in its discretion, give a contractor notice of defects, other than mistakes or omissions of form, in the contractor's Update Statement, and an opportunity to correct such defects, provided the correction of such defects is not prejudicial to fair competition. An awarding authority may reject a corrected Update Statement if it contains unfavorable information about the contractor that was omitted from the Update Statement filed with the contractor's bid. [810 CMR 8.05(2)].

PART 1 - COMPLETED PROJECTS

LIST ALL PUBLIC AND PRIVATE *BUILDING* PROJECTS YOUR FIRM HAS COMPLETED SINCE THE DATE OF APPLICATION FOR YOUR MOST RECENTLY ISSUED (NOT EXTENDED OR AMENDED) DCAM CERTIFICATE OF ELIGIBILITY. YOU MUST REPORT ALL REQUESTED INFORMATION NOT PREVIOUSLY REPORTED ON THAT DCAM APPLICATION*.

PROJECT TITLE & LOCATION	WORK CATEGORY	CONTRACT PRICE	START DATE	DATE COMPLETED

Attach additional sheets if necessary

* If your firm has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Update Statement.

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship? YES NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? YES NO

If you have answered YES to either question, explain. _____

PART 2 - CURRENTLY HELD CONTRACTS

LIST ALL PUBLIC AND PRIVATE BUILDING AND NON-BUILDING *CONSTRUCTION* PROJECTS YOUR FIRM HAS UNDER CONTRACT ON THIS DATE REGARDLESS OF WHEN OR WHETHER THE WORK COMMENCED.

1	2	3	4	5	6	7	8	9
PROJECT TITLE & LOCATION	WORK CATEGORY	START AND END DATES	ON SCHEDULE (yes / no)	CONTRACT PRICE	% NOT COMPLETE	\$ VALUE OF WORK NOT COMPLETE (col. 5 X col. 6)	NO. OF YEARS REMAINING (see note below)	ANNUALIZED VALUE OF INCOMPLETE WORK (col. 7 ÷ col. 8) (divided by)

ANNUALIZED VALUE OF ALL INCOMPLETE CONTRACT WORK (Total of Column 9)

\$ _____

- Column 8
- If less than one year is left in the project schedule, write 1.
 - If more than 12 months are left in the project schedule, divide the number of months left in the project schedule by 12 (calculate to three decimal places).

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE	COMPANY NAME	CONTACT PERSON	TELEPHONE
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone
	OWNER: Owner	Contact Person	Telephone
	DESIGNER: Designer	Contact Person	Telephone
	GC: GC	Contact Person	Telephone

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above either through a business or family relationship? YES NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? YES NO

If you have answered YES to either question, explain. _____

PART 3 - PROJECT PERFORMANCE

For Parts 3 and 4, if you answer YES to any question, please provide on a separate page a complete explanation. Information you provide herein must supplement the Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

	YES	NO
1. Has your firm been terminated on any contract prior to completing a project or has any officer, partner or principal of your firm been an officer, partner or principal of another firm that was terminated or failed to complete a project?	<input type="checkbox"/>	<input type="checkbox"/>
2. Has your firm failed or refused either to perform or complete any of its work under any contract prior to substantial completion?	<input type="checkbox"/>	<input type="checkbox"/>
3. Has your firm failed or refused to complete any punch list work under any contract?	<input type="checkbox"/>	<input type="checkbox"/>
4. Has your firm filed for bankruptcy, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that filed for bankruptcy?	<input type="checkbox"/>	<input type="checkbox"/>
5. Has your surety taken over or been asked to complete any of your work under any contract?	<input type="checkbox"/>	<input type="checkbox"/>
6. Has a payment or performance bond been invoked against your current firm, or has any officer, principal or individual with a financial interest in your current firm been an officer, principal or individual with a financial interest in another firm that had a payment or performance bond invoked?	<input type="checkbox"/>	<input type="checkbox"/>
7. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?	<input type="checkbox"/>	<input type="checkbox"/>
8. Has any subcontractor filed a demand for direct payment with an awarding authority for a public project on any of your contracts?	<input type="checkbox"/>	<input type="checkbox"/>
9. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic's lien against property in connection with work performed or materials supplied under any of your contracts?	<input type="checkbox"/>	<input type="checkbox"/>
10. Have there been any deaths of an employee or others occurring in connection with any of your projects?	<input type="checkbox"/>	<input type="checkbox"/>
11. Has any employee or other person suffered an injury in connection with any of your projects resulting in their inability to return to work for a period in excess of one year?	<input type="checkbox"/>	<input type="checkbox"/>

PART 4 - Legal or Administrative Proceedings; Compliance with Laws

Please answer the following questions. Information must supplement all judicial and administrative proceedings involving bidder’s firm, which were instituted or concluded (adversely or otherwise) since your firm’s Application for your most recently issued (not extended or amended) Certificate of Eligibility. You must report all requested information not previously reported on that DCAM Application for Prime/General Certificate of Eligibility.

The term “administrative proceeding” as used in this Prime/General Contractor Update Statement includes (i) any action taken or proceeding brought by a governmental agency, department or officer to enforce any law, regulation, code, legal, or contractual requirement, except for those brought in state or federal courts, or (ii) any action taken by a governmental agency, department or officer imposing penalties, fines or other sanctions for failure to comply with any such legal or contractual requirement.

The term “anyone with a financial interest in your firm” as used in this Section “I”, shall mean any person and/or entity with a 5% or greater ownership interest in the applicant’s firm.

If you answer YES to any question, on a separate page provide a complete explanation of each proceeding or action and any judgment, decision, fine or other sanction or result. Include all details (name of court or administrative agency, title of case or proceeding, case number, date action was commenced, date judgment or decision was entered, fines or penalties imposed, etc.).

	YES	NO
1. Have any civil, judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract, including but not limited to actions to obtain payment brought by subcontractors, suppliers or others?	<input type="checkbox"/>	<input type="checkbox"/>
2. Have any criminal proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to the procurement or performance of any construction contract including, but not limited to, any of the following offenses: fraud, graft, embezzlement, forgery, bribery, falsification or destruction of records, or receipt of stolen property?	<input type="checkbox"/>	<input type="checkbox"/>
3. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state’s or federal procurement laws arising out of the submission of bids or proposals?	<input type="checkbox"/>	<input type="checkbox"/>
4. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of M.G.L. Chapter 268A, the State Ethics Law?	<input type="checkbox"/>	<input type="checkbox"/>

PART 4 - Legal or Administrative Proceedings; Compliance with Laws (continued)

	YES	NO
5. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law regulating hours of labor, unemployment compensation, minimum wages, prevailing wages, overtime pay, equal pay, child labor or worker's compensation?	<input type="checkbox"/>	<input type="checkbox"/>
6. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of any state or federal law prohibiting discrimination in employment?	<input type="checkbox"/>	<input type="checkbox"/>
7. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?	<input type="checkbox"/>	<input type="checkbox"/>
8. Have any proceedings by a municipal, state, or federal agency been brought, concluded, or settled relating to decertification, debarment, or suspension of your firm or any principal or officer or anyone with a financial interest in your firm from public contracting?	<input type="checkbox"/>	<input type="checkbox"/>
9. Have any judicial or administrative proceedings involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled relating to a violation of state or federal law regulating the environment?	<input type="checkbox"/>	<input type="checkbox"/>
10. Has your firm been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety? Note: this information may be obtained from OSHA's Web Site at www.osha.gov	<input type="checkbox"/>	<input type="checkbox"/>
11. Has your firm been sanctioned for failure to achieve DBE/MBE/WBE goals, workforce goals, or failure to file certified payrolls on any public projects?	<input type="checkbox"/>	<input type="checkbox"/>
12. Other than previously reported in the above paragraphs of this Section I, have any administrative proceedings or investigations involving your firm or a principal or officer or anyone with a financial interest in your firm been brought, concluded, or settled by any local, state or federal agency relating to the procurement or performance of any construction contract?	<input type="checkbox"/>	<input type="checkbox"/>
13. Are there any other issues that you are aware which may affect your firm's responsibility and integrity as a building contractor?	<input type="checkbox"/>	<input type="checkbox"/>

PART 5 - SUPERVISORY PERSONNEL

List all supervisory personnel, such as project managers and superintendents, who will be assigned to the project if your firm is awarded the contract. **Attach the resume of each person listed below.**

NAME	TITLE OR FUNCTION

PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

Have there been any changes in your firm’s business organization, financial condition or bonding capacity since the date your current Certificate of Eligibility was issued? Yes No

If YES, attach a separate page providing complete details.

PART 7 – LIST OF COMPLETED CONSTRUCTION PROJECTS SUBMITTED TO THE DIVISION OF CAPITAL ASSET MANAGEMENT AND MAINTENANCE.

Attach here a copy of the list of completed construction projects which was submitted with your firm’s DCAM Application for your most recently issued (not extended or amended) DCAM Certificate of Eligibility. The Attachment must include a complete copy of the entire Section G – “Completed Projects” and the final page – “Certification” (Section J) containing the signature and date that the Completed Projects list (Section G) was submitted to the Division of Capital Asset Management and Maintenance.

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APPENDIX D
DCAMM SUB-BIDDER UPDATE STATEMENT



**SUB-BIDDERS' UPDATE STATEMENTS ARE NOT PUBLIC RECORDS AND
ARE NOT OPEN TO PUBLIC INSPECTION (M.G.L. C.149, §44D)**

Sub-Bidder Update Statement

TO ALL SUB-BIDDERS, TRADE CONTRACTORS AND AWARDING AUTHORITIES

A COMPLETED AND SIGNED SUB-BIDDER UPDATE STATEMENT MUST BE SUBMITTED WITH EVERY FILED SUB-BID PURSUANT TO M.G.L. c.149, §44F AND EVERY TRADE SUB-BID PURSUANT TO M.G.L. c. 149A. ANY FILED SUB-BID OR TRADE SUB-BID SUBMITTED WITHOUT AN APPROPRIATE SUB-BIDDER UPDATE STATEMENT IS INVALID AND MUST BE REJECTED.

Caution: This form is to be used for submitting Filed Sub-Bids and Trade Sub-Bids Only

AWARDING AUTHORITIES

If the Awarding Authority determines that the Sub-Bidder is not competent to perform the work as specified on the project, it should reject the bid.

SUB-BIDDER'S AFFIDAVIT

I swear under the pains and penalties of perjury that I am duly authorized by the bidder named below to sign and submit this Sub-Bidder Update Statement on behalf of the bidder named below, that I have read this Sub-Bidder Update Statement, and that all of the information provided by the bidder in this Sub-Bidder Update Statement is true, accurate, and complete as of the bid date.

Bid Date

Print Name of Sub-Bidder or Trade Contractor

Project Number
(or name if no number)

Business Address

Awarding Authority

Telephone Number

SIGNATURE⇒

Bidder's Authorized Representative

INSTRUCTIONS

INSTRUCTIONS TO SUB-BIDDERS

- This form must be completed and submitted by all Filed Sub-Bidders bidding on projects and Trade Contractors bidding on projects.
- You must give complete and accurate answers to all questions and provide all of the information requested. MAKING A MATERIALLY FALSE STATEMENT IN THIS SUB-BIDDER UPDATE STATEMENT IS GROUNDS FOR REJECTING YOUR BID AND FOR DEBARRING YOU FROM ALL PUBLIC CONTRACTING.
- This Sub-Bidder Update Statement must include all requested information that was not previously reported on the application used for your company's most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. **The Sub-Bidder Update Statement must cover the entire period since the date of that application, NOT since the date of your Certification.**
- You must use this official form of Sub-Bidder Update Statement. Copies of this form may be obtained from the awarding authority or from the DCAMM Web Site:
www.mass.gov/DCAMM/certification.
- If additional space is needed, please copy the appropriate page of this Sub-Bidder Update Statement and attach it as an additional sheet.
- It is acceptable to attach your projects in progress and completed projects spreadsheet for Part 7.

INSTRUCTIONS TO AWARDING AUTHORITIES

Determination of Sub-Bidder Qualifications

- It is the awarding authority's responsibility to determine each responsible bidder. You must consider all of the information in the bidder's Sub-Bidder Update Statement in making this determination. **Remember: this information was not available to the Division of Capital Asset Management and Maintenance at the time of certification.**
- The Sub-Bidder's performance on the projects listed in Parts 1 and 2 must be part of your review.
- Contact the project references.
- AWARDING AUTHORITIES ARE STRONGLY ENCOURAGED TO REVIEW THE LOW BIDDERS CERTIFICATION FILE. WITH THE IMPLEMENTATION OF ELECTRONIC DOCUMENT MANAGEMENT FILE REVIEWS CAN BE PROVIDED ELECTRONICALLY. To discuss your request/options contact DCAMM's Contractor Certification (857) 204-1305.

Correction of Errors and Omissions in Sub-Bidder Update Statements

Matters of Form: An awarding authority shall not reject a Sub-Bidder's bid because there are mistakes or omissions of form in the Sub-Bidder Update Statement submitted with the bid provided the Sub-Bidder promptly corrects those mistakes or omissions upon request of the awarding authority.

Correction of Other Defects: An awarding authority may, in its discretion, give a Sub-Bidder notice of minor defects and omissions as to form in the Sub-Bidder's Update Statement and provide an opportunity to correct its Sub-Bidder Update Statement. However, the Sub-Bidder shall not be allowed to make corrections to a Sub-Bidder Update Statement if material information about the Sub-Bidder was omitted from the Sub-Bidder Update Statement filed with the Sub-Bidder's bid. The Awarding Authority shall advise DCAMM of any material omissions in a Sub-Bidder's Update Statement.

PART 1 - COMPLETED PROJECTS

List All Public And Private Projects Of \$20,000 or more your company has completed since the date of application for your most recently issued (not extended or amended) Sub-Bidder Certificate Of Eligibility*.

PROJECT TITLE & LOCATION	WORK CATEGORY	CONTRACT PRICE	START DATE	DATE COMPLETED

Attach additional sheets if necessary

* If your company has been terminated from a project prior to completion of the work or has failed or refused to complete its work under any contract, full details and an explanation must be provided. See Part 3 of this Sub-Bidder Update Statement.

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH COMPLETED PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE		COMPANY NAME	CONTACT PERSON	TELEPHONE	EMAIL ADDRESS
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above, either through a business or family relationship? YES NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? YES NO

If you have answered YES to either question, explain. _____

PART 2 – PROJECTS IN PROGRESS CONTRACTS

List all public and private projects of \$20,000 or more your company has under contract on this date regardless of when or whether the work commenced.

1	2	3	4	5	6	7
PROJECT TITLE & LOCATION	WORK CATEGORY	START AND END DATES (MM/YYYY)	ON SCHEDULE (yes / no)	CONTRACT PRICE	% NOT COMPLETE	\$ VALUE OF WORK NOT COMPLETE (col. 5 X col. 6)

PROVIDE THE FOLLOWING REFERENCE INFORMATION FOR EACH INCOMPLETE PROJECT LISTED ON THE PREVIOUS PAGE.

PROJECT TITLE		COMPANY NAME	CONTACT PERSON	TELEPHONE	EMAIL ADDRESS
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				
	OWNER:				
	DESIGNER				
	GC:				

Is your company or any individual who owns, manages or controls your company affiliated with any owner, designer or general contractor named above either through a business or family relationship? YES NO

Are any of the contact persons named above affiliated with your company or any individual who owns, manages or control your company, either through a business or family relationship? YES NO

If you have answered YES to either question, explain. _____

PART 3 - GENERAL PERFORMANCE (in the prime update it's called Project Performance – can we change it?)

For Parts 3 and 4, if you answer YES to any question, please provide on a separate page a complete explanation. Information you provide herein must supplement the application for your most recently issued (not extended or amended) DCAMM Sub-Bidder Certificate of Eligibility. You must report all requested information not previously reported on that application. Include all details [project name(s) and location(s), names of all parties involved, relevant dates, etc.].

	YES	NO
1. Has your company been terminated on any contract prior to completing a project or has any officer, partner or principal of your company been an officer, partner or principal of another company that was terminated or failed to complete a project?	<input type="checkbox"/>	<input type="checkbox"/>
2. Has your company failed or refused either to perform or complete any of its work under any contract prior to substantial completion?	<input type="checkbox"/>	<input type="checkbox"/>
3. Has your company failed or refused to complete any punch list work under any contract?	<input type="checkbox"/>	<input type="checkbox"/>
4. Has your company filed for bankruptcy, or has any officer, principal or individual with a financial interest in your current company been an officer, principal or individual with a financial interest in another company that filed for bankruptcy?	<input type="checkbox"/>	<input type="checkbox"/>
5. Has your surety taken over or been asked to complete any of your work under any contract?	<input type="checkbox"/>	<input type="checkbox"/>
6. Has a payment or performance bond been invoked against your current company, or has any officer, principal or individual with a financial interest in your current company been an officer, principal or individual with a financial interest in another company that had a payment or performance bond invoked?	<input type="checkbox"/>	<input type="checkbox"/>
7. Has your surety made payment to a materials supplier or other party under your payment bond on any contract?	<input type="checkbox"/>	<input type="checkbox"/>
8. Has any subcontractor filed a demand for direct payment with an awarding authority for a public project on any of your contracts?	<input type="checkbox"/>	<input type="checkbox"/>
9. Have any of your subcontractors or suppliers filed litigation to enforce a mechanic's lien against property in connection with work performed or materials supplied under any of your contracts?	<input type="checkbox"/>	<input type="checkbox"/>
10. Have there been any deaths of an employee or others occurring in connection with any of your projects?	<input type="checkbox"/>	<input type="checkbox"/>
11. Has any employee or other person suffered an injury in connection with any of your projects resulting in their inability to return to work for a period in excess of one year?	<input type="checkbox"/>	<input type="checkbox"/>

PART 4 - Legal or Administrative Proceedings; Compliance with Laws

Please answer the following questions. Information must supplement all judicial and administrative proceedings involving bidder’s company, which were instituted or concluded (adversely or otherwise) since your company’s Application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. You must report all requested information not previously reported on that DCAMM Application.

The term “administrative proceeding” as used in this Sub-Bidder Update Statement includes (i) any action taken or proceeding brought by a governmental agency, department or officer to enforce any law, regulation, code, legal, or contractual requirement, except for those brought in state or federal courts, or (ii) any action taken by a governmental agency, department or officer imposing penalties, fines or other sanctions for failure to comply with any such legal or contractual requirement.

The term “anyone with a financial interest in your company” as used in this Section “1”, shall mean any person and/or entity with a 5% or greater ownership interest in the applicant’s company.

If you answer YES to any question, on a separate page provide a complete explanation of each proceeding or action and any judgment, decision, fine or other sanction or result. Include all details (name of court or administrative agency, title of case or proceeding, case number, date action was commenced, date judgment or decision was entered, fines or penalties imposed, etc.).

	YES	NO
1. Have any civil, judicial or administrative proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to the procurement or performance of any construction contract, including but not limited to actions to obtain payment brought by subcontractors, suppliers or others?	<input type="checkbox"/>	<input type="checkbox"/>
2. Have any criminal proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to the procurement or performance of any construction contract including, but not limited to, any of the following offenses: fraud, graft, embezzlement, forgery, bribery, falsification or destruction of records, or receipt of stolen property?	<input type="checkbox"/>	<input type="checkbox"/>
3. Have any judicial or administrative proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to a violation of any state’s or federal procurement laws arising out of the submission of bids or proposals?	<input type="checkbox"/>	<input type="checkbox"/>
4. Have any judicial or administrative proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to a violation of M.G.L. Chapter 268A, the State Ethics Law?	<input type="checkbox"/>	<input type="checkbox"/>

PART 4 - Legal or Administrative Proceedings; Compliance with Laws (continued)

	YES	NO
5. Have any judicial or administrative proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to a violation of any state or federal law regulating hours of labor, unemployment compensation, minimum wages, prevailing wages, overtime pay, equal pay, child labor or worker’s compensation?	<input type="checkbox"/>	<input type="checkbox"/>
6. Have any judicial or administrative proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to a violation of any state or federal law prohibiting discrimination in employment?	<input type="checkbox"/>	<input type="checkbox"/>
7. Have any judicial or administrative proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to a claim of repeated or aggravated violation of any state or federal law regulating labor relations?	<input type="checkbox"/>	<input type="checkbox"/>
8. Have any proceedings by a municipal, state, or federal agency been brought, concluded, or settled relating to decertification, debarment, or suspension of your company or any principal or officer or anyone with a financial interest in your company from public contracting?	<input type="checkbox"/>	<input type="checkbox"/>
9. Have any judicial or administrative proceedings involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled relating to a violation of state or federal law regulating the environment?	<input type="checkbox"/>	<input type="checkbox"/>
10. Has your company been fined by OSHA or any other state or federal agency for violations of any laws or regulations related to occupational health or safety? Note: this information may be obtained from OSHA’s Web Site at www.osha.gov	<input type="checkbox"/>	<input type="checkbox"/>
11. Has your company been sanctioned for failure to achieve DBE/MBE/WBE goals, workforce goals, or failure to file certified payrolls on any public projects?	<input type="checkbox"/>	<input type="checkbox"/>
12. Other than previously reported in the above paragraphs of this Section I, have any administrative proceedings or investigations involving your company or a principal or officer or anyone with a financial interest in your company been brought, concluded, or settled by any local, state or federal agency relating to the procurement or performance of any construction contract?	<input type="checkbox"/>	<input type="checkbox"/>
13. Are there any other issues that you are aware which may affect your company’s responsibility and integrity as a building contractor?	<input type="checkbox"/>	<input type="checkbox"/>

PART 5 - SUPERVISORY PERSONNEL

List all supervisory personnel who will be assigned to the project if your company is awarded the contract.

Attach the resume of each person listed below.

NAME	TITLE OR FUNCTION

PART 6 - CHANGES IN BUSINESS ORGANIZATION OR FINANCIAL CONDITION

Have there been any changes in your company’s business organization, financial condition or bonding capacity since the date your current Contractor Certificate of Eligibility was issued? Yes No

If YES, attach a separate page providing complete details.

PART 7 – LIST OF COMPLETED CONSTRUCTION PROJECTS SUBMITTED TO THE DIVISION OF CAPITAL ASSET MANAGEMENT AND MAINTENANCE ALONG WITH CERTIFICATION SIGNATURE PAGE.

Attach here a copy of the list of completed construction projects which was submitted with your company’s application for your most recently issued (not extended or amended) Sub-Bidder Certificate of Eligibility. The Attachment must include a complete copy of the entire Completed Projects spreadsheet and the final page Certification Page of the online application, containing the signature and date the completed projects list was submitted to the Division of Capital Asset Management and Maintenance.

APPENDIX E

MASSACHUSETTS PREVAILING WAGE RATE SCHEDULE



CHARLES D. BAKER
Governor

KARYN E. POLITO
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

ROSALIN ACOSTA
Secretary
MICHAEL FLANAGAN
Director

Awarding Authority: Town of Wilmington
Contract Number: **City/Town:** WILMINGTON
Description of Work: Salem Street Wellfield Project - Install three (3) 18" by 24" diameter wells and installation of 6" diameter ductile iron piping and fittings which are required to deliver raw water to the Town.
Job Location: Salem Street Rear, Wilmington MA 01887

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- 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 from the Department of Labor Standards ("DLS") 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 any sub-contractor.
 - All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person 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 DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
 - 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. Awarding authorities are required to request these updates 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, 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. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
 - Every contractor or subcontractor which performs construction work on the project is required to 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. A sample of a payroll reporting form may be obtained at <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.
 - Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
 - 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.
-

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>	06/01/2021	\$35.95	\$12.91	\$14.82	\$0.00	\$63.68
	08/01/2021	\$35.95	\$13.41	\$14.82	\$0.00	\$64.18
	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>	06/01/2021	\$36.02	\$12.91	\$14.82	\$0.00	\$63.75
	08/01/2021	\$36.02	\$13.41	\$14.82	\$0.00	\$64.25
	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>	06/01/2021	\$36.14	\$12.91	\$14.82	\$0.00	\$63.87
	08/01/2021	\$36.14	\$13.41	\$14.82	\$0.00	\$64.37
	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>	06/01/2021	\$35.75	\$8.60	\$16.64	\$0.00	\$60.99
	12/01/2021	\$36.66	\$8.60	\$16.64	\$0.00	\$61.90
	06/01/2022	\$37.56	\$8.60	\$16.64	\$0.00	\$62.80
	12/01/2022	\$38.41	\$8.60	\$16.64	\$0.00	\$63.65
	06/01/2023	\$39.31	\$8.60	\$16.64	\$0.00	\$64.55
	12/01/2023	\$40.21	\$8.60	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	12/01/2020	\$38.10	\$12.80	\$9.45	\$0.00	\$60.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.73	\$13.75	\$15.80	\$0.00	\$80.28
	12/01/2021	\$51.88	\$13.75	\$15.80	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.73	\$13.75	\$15.80	\$0.00	\$80.28
	12/01/2021	\$51.88	\$13.75	\$15.80	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.75	\$8.60	\$16.64	\$0.00	\$60.99
	12/01/2021	\$36.66	\$8.60	\$16.64	\$0.00	\$61.90
	06/01/2022	\$37.56	\$8.60	\$16.64	\$0.00	\$62.80
	12/01/2022	\$38.41	\$8.60	\$16.64	\$0.00	\$63.65
	06/01/2023	\$39.31	\$8.60	\$16.64	\$0.00	\$64.55
	12/01/2023	\$40.21	\$8.60	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2020	\$46.10	\$7.07	\$17.98	\$0.00	\$71.15

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$29.97	\$7.07	\$11.69	\$0.00	\$48.73
2	65	\$29.97	\$7.07	\$11.69	\$0.00	\$48.73
3	70	\$32.27	\$7.07	\$12.59	\$0.00	\$51.93
4	75	\$34.58	\$7.07	\$13.49	\$0.00	\$55.14
5	80	\$36.88	\$7.07	\$14.38	\$0.00	\$58.33
6	85	\$39.19	\$7.07	\$15.29	\$0.00	\$61.55
7	90	\$41.49	\$7.07	\$16.18	\$0.00	\$64.74
8	95	\$43.80	\$7.07	\$17.09	\$0.00	\$67.96

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) <i>BRICKLAYERS LOCAL 3 (LOWELL)</i>	02/01/2021	\$53.61	\$11.39	\$21.41	\$0.00	\$86.41
	08/01/2021	\$55.01	\$11.39	\$21.57	\$0.00	\$87.97
	02/01/2022	\$55.59	\$11.39	\$21.57	\$0.00	\$88.55

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Lowell

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.81	\$11.39	\$21.41	\$0.00	\$59.61
2	60	\$32.17	\$11.39	\$21.41	\$0.00	\$64.97
3	70	\$37.53	\$11.39	\$21.41	\$0.00	\$70.33
4	80	\$42.89	\$11.39	\$21.41	\$0.00	\$75.69
5	90	\$48.25	\$11.39	\$21.41	\$0.00	\$81.05

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.51	\$11.39	\$21.57	\$0.00	\$60.47
2	60	\$33.01	\$11.39	\$21.57	\$0.00	\$65.97
3	70	\$38.51	\$11.39	\$21.57	\$0.00	\$71.47
4	80	\$44.01	\$11.39	\$21.57	\$0.00	\$76.97
5	90	\$49.51	\$11.39	\$21.57	\$0.00	\$82.47

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2021	\$41.82	\$8.60	\$17.72	\$0.00	\$68.14
	12/01/2021	\$42.83	\$8.60	\$17.72	\$0.00	\$69.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2021	\$40.67	\$8.60	\$17.72	\$0.00	\$66.99
	12/01/2021	\$41.68	\$8.60	\$17.72	\$0.00	\$68.00
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2021	\$40.67	\$8.60	\$17.72	\$0.00	\$66.99
	12/01/2021	\$41.68	\$8.60	\$17.72	\$0.00	\$68.00
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	03/01/2021	\$43.54	\$9.40	\$18.95	\$0.00	\$71.89
	09/01/2021	\$44.19	\$9.40	\$18.95	\$0.00	\$72.54
	03/01/2022	\$44.79	\$9.40	\$18.95	\$0.00	\$73.14
	09/01/2022	\$45.44	\$9.40	\$18.95	\$0.00	\$73.79
	03/01/2023	\$46.04	\$9.40	\$18.95	\$0.00	\$74.39

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.77	\$9.40	\$1.73	\$0.00	\$32.90
2	60	\$26.12	\$9.40	\$1.73	\$0.00	\$37.25
3	70	\$30.48	\$9.40	\$13.76	\$0.00	\$53.64
4	75	\$32.66	\$9.40	\$13.76	\$0.00	\$55.82
5	80	\$34.83	\$9.40	\$15.49	\$0.00	\$59.72
6	80	\$34.83	\$9.40	\$15.49	\$0.00	\$59.72
7	90	\$39.19	\$9.40	\$17.22	\$0.00	\$65.81
8	90	\$39.19	\$9.40	\$17.22	\$0.00	\$65.81

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.10	\$9.40	\$1.73	\$0.00	\$33.23
2	60	\$26.51	\$9.40	\$1.73	\$0.00	\$37.64
3	70	\$30.93	\$9.40	\$13.76	\$0.00	\$54.09
4	75	\$33.14	\$9.40	\$13.76	\$0.00	\$56.30
5	80	\$35.35	\$9.40	\$15.49	\$0.00	\$60.24
6	80	\$35.35	\$9.40	\$15.49	\$0.00	\$60.24
7	90	\$39.77	\$9.40	\$17.22	\$0.00	\$66.39
8	90	\$39.77	\$9.40	\$17.22	\$0.00	\$66.39

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$30.72/ 3&4 \$36.75/ 5&6 \$55.37/ 7&8 \$61.45

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME	04/01/2021	\$23.16	\$7.21	\$4.80	\$0.00	\$35.17
CARPENTERS-ZONE 3 (Wood Frame)	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 - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$13.90	\$7.21	\$0.00	\$0.00	\$21.11
2	60	\$13.90	\$7.21	\$0.00	\$0.00	\$21.11
3	65	\$15.05	\$7.21	\$0.00	\$0.00	\$22.26
4	70	\$16.21	\$7.21	\$0.00	\$0.00	\$23.42
5	75	\$17.37	\$7.21	\$3.80	\$0.00	\$28.38
6	80	\$18.53	\$7.21	\$3.80	\$0.00	\$29.54
7	85	\$19.69	\$7.21	\$3.80	\$0.00	\$30.70
8	90	\$20.84	\$7.21	\$3.80	\$0.00	\$31.85

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

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
 Step 1&2 \$17.63/ 3&4 \$19.95/ 5&6 \$27.22/ 7&8 \$29.54

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING BRICKLAYERS LOCAL 3 (LOWELL)	01/01/2020	\$45.23	\$12.75	\$22.41	\$0.62	\$81.01
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Apprentice - CEMENT MASONRY/PLASTERING - Lowell

Effective Date - 01/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.62	\$12.75	\$15.41	\$0.00	\$50.78
2	60	\$27.14	\$12.75	\$17.41	\$0.62	\$57.92
3	65	\$29.40	\$12.75	\$18.41	\$0.62	\$61.18
4	70	\$31.66	\$12.75	\$19.41	\$0.62	\$64.44
5	75	\$33.92	\$12.75	\$20.41	\$0.62	\$67.70
6	80	\$36.18	\$12.75	\$21.41	\$0.62	\$70.96
7	90	\$40.71	\$12.75	\$22.41	\$0.62	\$76.49

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$51.73	\$13.75	\$15.80	\$0.00	\$81.28
	12/01/2021	\$52.88	\$13.75	\$15.80	\$0.00	\$82.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$33.40	\$13.75	\$15.80	\$0.00	\$62.95
	12/01/2021	\$34.19	\$13.75	\$15.80	\$0.00	\$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2021	\$52.06	\$8.25	\$22.75	\$0.00	\$83.06

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.03	\$8.25	\$0.00	\$0.00	\$34.28
2	55	\$28.63	\$8.25	\$6.16	\$0.00	\$43.04
3	60	\$31.24	\$8.25	\$6.72	\$0.00	\$46.21
4	65	\$33.84	\$8.25	\$7.28	\$0.00	\$49.37
5	70	\$36.44	\$8.25	\$19.39	\$0.00	\$64.08
6	75	\$39.05	\$8.25	\$19.95	\$0.00	\$67.25
7	80	\$41.65	\$8.25	\$20.51	\$0.00	\$70.41
8	90	\$46.85	\$8.25	\$21.63	\$0.00	\$76.73

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN <i>LABORERS - ZONE 2</i>	06/01/2021	\$40.82	\$8.60	\$17.57	\$0.00	\$66.99
	12/01/2021	\$41.83	\$8.60	\$17.57	\$0.00	\$68.00
	06/01/2022	\$42.83	\$8.60	\$17.57	\$0.00	\$69.00
	12/01/2022	\$43.83	\$8.60	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.83	\$8.60	\$17.57	\$0.00	\$71.00
	12/01/2023	\$46.08	\$8.60	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2021	\$41.82	\$8.60	\$17.57	\$0.00	\$67.99
	12/01/2021	\$42.83	\$8.60	\$17.57	\$0.00	\$69.00
	06/01/2022	\$43.83	\$8.60	\$17.57	\$0.00	\$70.00
	12/01/2022	\$44.83	\$8.60	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.83	\$8.60	\$17.57	\$0.00	\$72.00
	12/01/2023	\$47.08	\$8.60	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BURNERS <i>LABORERS - ZONE 2</i>	06/01/2021	\$41.57	\$8.60	\$17.57	\$0.00	\$67.74
	12/01/2021	\$42.58	\$8.60	\$17.57	\$0.00	\$68.75
	06/01/2022	\$43.58	\$8.60	\$17.57	\$0.00	\$69.75
	12/01/2022	\$44.58	\$8.60	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.58	\$8.60	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.83	\$8.60	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 2</i>	06/01/2021	\$41.82	\$8.60	\$17.57	\$0.00	\$67.99
	12/01/2021	\$42.83	\$8.60	\$17.57	\$0.00	\$69.00
	06/01/2022	\$43.83	\$8.60	\$17.57	\$0.00	\$70.00
	12/01/2022	\$44.83	\$8.60	\$17.57	\$0.00	\$71.00
	06/01/2023	\$45.83	\$8.60	\$17.57	\$0.00	\$72.00
	12/01/2023	\$47.08	\$8.60	\$17.57	\$0.00	\$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2021	\$41.57	\$8.60	\$17.57	\$0.00	\$67.74
	12/01/2021	\$42.58	\$8.60	\$17.57	\$0.00	\$68.75
	06/01/2022	\$43.58	\$8.60	\$17.57	\$0.00	\$69.75
	12/01/2022	\$44.58	\$8.60	\$17.57	\$0.00	\$70.75
	06/01/2023	\$45.58	\$8.60	\$17.57	\$0.00	\$71.75
	12/01/2023	\$46.83	\$8.60	\$17.57	\$0.00	\$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	06/01/2021	\$40.82	\$8.60	\$17.57	\$0.00	\$66.99
	12/01/2021	\$41.83	\$8.60	\$17.57	\$0.00	\$68.00
	06/01/2022	\$42.83	\$8.60	\$17.57	\$0.00	\$69.00
	12/01/2022	\$43.83	\$8.60	\$17.57	\$0.00	\$70.00
	06/01/2023	\$44.83	\$8.60	\$17.57	\$0.00	\$71.00
	12/01/2023	\$46.08	\$8.60	\$17.57	\$0.00	\$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELECTRICIAN <i>ELECTRICIANS LOCAL 103</i>	03/01/2021	\$55.41	\$13.00	\$20.01	\$0.00	\$88.42
	09/01/2021	\$56.84	\$13.00	\$20.06	\$0.00	\$89.90
	03/01/2022	\$58.04	\$13.00	\$20.09	\$0.00	\$91.13
	09/01/2022	\$59.48	\$13.00	\$20.13	\$0.00	\$92.61
	03/01/2023	\$60.67	\$13.00	\$20.17	\$0.00	\$93.84

Apprentice - *ELECTRICIAN - Local 103*

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$22.16	\$13.00	\$0.66	\$0.00	\$35.82
2	40	\$22.16	\$13.00	\$0.66	\$0.00	\$35.82
3	45	\$24.93	\$13.00	\$15.13	\$0.00	\$53.06
4	45	\$24.93	\$13.00	\$15.13	\$0.00	\$53.06
5	50	\$27.71	\$13.00	\$15.57	\$0.00	\$56.28
6	55	\$30.48	\$13.00	\$16.01	\$0.00	\$59.49
7	60	\$33.25	\$13.00	\$16.46	\$0.00	\$62.71
8	65	\$36.02	\$13.00	\$16.90	\$0.00	\$65.92
9	70	\$38.79	\$13.00	\$17.34	\$0.00	\$69.13
10	75	\$41.56	\$13.00	\$17.80	\$0.00	\$72.36

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$22.74	\$13.00	\$0.68	\$0.00	\$36.42
2	40	\$22.74	\$13.00	\$0.68	\$0.00	\$36.42
3	45	\$25.58	\$13.00	\$15.15	\$0.00	\$53.73
4	45	\$25.58	\$13.00	\$15.15	\$0.00	\$53.73
5	50	\$28.42	\$13.00	\$15.59	\$0.00	\$57.01
6	55	\$31.26	\$13.00	\$16.04	\$0.00	\$60.30
7	60	\$34.10	\$13.00	\$16.48	\$0.00	\$63.58
8	65	\$36.95	\$13.00	\$16.93	\$0.00	\$66.88
9	70	\$39.79	\$13.00	\$17.37	\$0.00	\$70.16
10	75	\$42.63	\$13.00	\$17.83	\$0.00	\$73.46

Notes :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2021	\$63.47	\$15.88	\$19.31	\$0.00	\$98.66
	01/01/2022	\$65.62	\$16.03	\$20.21	\$0.00	\$101.86

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELEVATOR CONSTRUCTOR - Local 4

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.74	\$15.88	\$0.00	\$0.00	\$47.62
2	55	\$34.91	\$15.88	\$19.31	\$0.00	\$70.10
3	65	\$41.26	\$15.88	\$19.31	\$0.00	\$76.45
4	70	\$44.43	\$15.88	\$19.31	\$0.00	\$79.62
5	80	\$50.78	\$15.88	\$19.31	\$0.00	\$85.97

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 <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2021	\$44.43	\$15.88	\$19.31	\$0.00	\$79.62
	01/01/2022	\$45.93	\$16.03	\$20.21	\$0.00	\$82.17
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2021	\$45.88	\$13.50	\$15.70	\$0.00	\$75.08
	11/01/2021	\$46.88	\$13.50	\$15.70	\$0.00	\$76.08
	05/01/2022	\$48.03	\$13.50	\$15.70	\$0.00	\$77.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2021	\$47.40	\$13.50	\$15.70	\$0.00	\$76.60
	11/01/2021	\$48.41	\$13.50	\$15.70	\$0.00	\$77.61
	05/01/2022	\$49.57	\$13.50	\$15.70	\$0.00	\$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2021	\$22.91	\$13.50	\$15.70	\$0.00	\$52.11
	11/01/2021	\$23.51	\$13.50	\$15.70	\$0.00	\$52.71
	05/01/2022	\$24.18	\$13.50	\$15.70	\$0.00	\$53.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	03/01/2021	\$55.41	\$13.00	\$20.01	\$0.00	\$88.42
	09/01/2021	\$56.84	\$13.00	\$20.06	\$0.00	\$89.90
	03/01/2022	\$58.04	\$13.00	\$20.09	\$0.00	\$91.13
	09/01/2022	\$59.48	\$13.00	\$20.13	\$0.00	\$92.61
	03/01/2023	\$60.67	\$13.00	\$20.17	\$0.00	\$93.84
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE <i>LOCAL 103</i> / COMMISSIONING <i>ELECTRICIANS</i>	03/01/2021	\$42.11	\$13.00	\$17.88	\$0.00	\$72.99
	09/01/2021	\$43.77	\$13.00	\$18.00	\$0.00	\$74.77
	03/01/2022	\$45.27	\$13.00	\$18.12	\$0.00	\$76.39
	09/01/2022	\$46.99	\$13.00	\$18.24	\$0.00	\$78.23
	03/01/2023	\$48.54	\$13.00	\$18.37	\$0.00	\$79.91
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$41.31	\$13.75	\$15.80	\$0.00	\$70.86
	12/01/2021	\$42.26	\$13.75	\$15.80	\$0.00	\$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE I</i>	03/01/2021	\$48.59	\$9.40	\$19.25	\$0.00	\$77.24
	09/01/2021	\$49.39	\$9.40	\$19.25	\$0.00	\$78.04
	03/01/2022	\$50.19	\$9.40	\$19.25	\$0.00	\$78.84

Apprentice - FLOORCOVERER - Local 2168 Zone I

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.30	\$9.40	\$1.79	\$0.00	\$35.49
2	55	\$26.72	\$9.40	\$1.79	\$0.00	\$37.91
3	60	\$29.15	\$9.40	\$13.88	\$0.00	\$52.43
4	65	\$31.58	\$9.40	\$13.88	\$0.00	\$54.86
5	70	\$34.01	\$9.40	\$15.67	\$0.00	\$59.08
6	75	\$36.44	\$9.40	\$15.67	\$0.00	\$61.51
7	80	\$38.87	\$9.40	\$17.46	\$0.00	\$65.73
8	85	\$41.30	\$9.40	\$17.46	\$0.00	\$68.16

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.70	\$9.40	\$1.79	\$0.00	\$35.89
2	55	\$27.16	\$9.40	\$1.79	\$0.00	\$38.35
3	60	\$29.63	\$9.40	\$13.88	\$0.00	\$52.91
4	65	\$32.10	\$9.40	\$13.88	\$0.00	\$55.38
5	70	\$34.57	\$9.40	\$15.67	\$0.00	\$59.64
6	75	\$37.04	\$9.40	\$15.67	\$0.00	\$62.11
7	80	\$39.51	\$9.40	\$17.46	\$0.00	\$66.37
8	85	\$41.98	\$9.40	\$17.46	\$0.00	\$68.84

Notes: Steps are 750 hrs.
 % After 09/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
 Step 1&2 \$33.03/ 3&4 \$39.64/ 5&6 \$59.08/ 7&8 \$65.73

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>	06/01/2021	\$50.73	\$13.75	\$15.80	\$0.00	\$80.28
	12/01/2021	\$51.88	\$13.75	\$15.80	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$33.40	\$13.75	\$15.80	\$0.00	\$62.95
	12/01/2021	\$34.19	\$13.75	\$15.80	\$0.00	\$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	01/01/2021	\$41.56	\$8.25	\$22.75	\$0.00	\$72.56

Apprentice - GLAZIER - Local 35 Zone 2

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.78	\$8.25	\$0.00	\$0.00	\$29.03
2	55	\$22.86	\$8.25	\$6.16	\$0.00	\$37.27
3	60	\$24.94	\$8.25	\$6.72	\$0.00	\$39.91
4	65	\$27.01	\$8.25	\$7.28	\$0.00	\$42.54
5	70	\$29.09	\$8.25	\$19.39	\$0.00	\$56.73
6	75	\$31.17	\$8.25	\$19.95	\$0.00	\$59.37
7	80	\$33.25	\$8.25	\$20.51	\$0.00	\$62.01
8	90	\$37.40	\$8.25	\$21.63	\$0.00	\$67.28

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.73	\$13.75	\$15.80	\$0.00	\$80.28
	12/01/2021	\$51.88	\$13.75	\$15.80	\$0.00	\$81.43

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$27.90	\$13.75	\$0.00	\$0.00	\$41.65
2	60	\$30.44	\$13.75	\$15.80	\$0.00	\$59.99
3	65	\$32.97	\$13.75	\$15.80	\$0.00	\$62.52
4	70	\$35.51	\$13.75	\$15.80	\$0.00	\$65.06
5	75	\$38.05	\$13.75	\$15.80	\$0.00	\$67.60
6	80	\$40.58	\$13.75	\$15.80	\$0.00	\$70.13
7	85	\$43.12	\$13.75	\$15.80	\$0.00	\$72.67
8	90	\$45.66	\$13.75	\$15.80	\$0.00	\$75.21

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$28.53	\$13.75	\$0.00	\$0.00	\$42.28
2	60	\$31.13	\$13.75	\$15.80	\$0.00	\$60.68
3	65	\$33.72	\$13.75	\$15.80	\$0.00	\$63.27
4	70	\$36.32	\$13.75	\$15.80	\$0.00	\$65.87
5	75	\$38.91	\$13.75	\$15.80	\$0.00	\$68.46
6	80	\$41.50	\$13.75	\$15.80	\$0.00	\$71.05
7	85	\$44.10	\$13.75	\$15.80	\$0.00	\$73.65
8	90	\$46.69	\$13.75	\$15.80	\$0.00	\$76.24

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 17 - A	02/01/2021	\$51.67	\$13.65	\$24.57	\$2.70	\$92.59
	08/01/2021	\$53.42	\$13.65	\$24.57	\$2.75	\$94.39
	02/01/2022	\$55.17	\$13.65	\$24.57	\$2.80	\$96.19

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 103	03/01/2021	\$55.41	\$13.00	\$20.01	\$0.00	\$88.42
	09/01/2021	\$56.84	\$13.00	\$20.06	\$0.00	\$89.90
	03/01/2022	\$58.04	\$13.00	\$20.09	\$0.00	\$91.13
	09/01/2022	\$59.48	\$13.00	\$20.13	\$0.00	\$92.61
	03/01/2023	\$60.67	\$13.00	\$20.17	\$0.00	\$93.84

For apprentice rates see "Apprentice- ELECTRICIAN"

HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 17 - A	02/01/2021	\$51.67	\$13.65	\$24.57	\$2.70	\$92.59
	08/01/2021	\$53.42	\$13.65	\$24.57	\$2.75	\$94.39
	02/01/2022	\$55.17	\$13.65	\$24.57	\$2.80	\$96.19

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (TESTING AND BALANCING - WATER) PIPEFITTERS LOCAL 537	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
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For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

HVAC MECHANIC PIPEFITTERS LOCAL 537	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
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Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS LABORERS - ZONE 2	06/01/2021	\$35.75	\$8.60	\$16.64	\$0.00	\$60.99
	12/01/2021	\$36.66	\$8.60	\$16.64	\$0.00	\$61.90
	06/01/2022	\$37.56	\$8.60	\$16.64	\$0.00	\$62.80
	12/01/2022	\$38.41	\$8.60	\$16.64	\$0.00	\$63.65
	06/01/2023	\$39.31	\$8.60	\$16.64	\$0.00	\$64.55
	12/01/2023	\$40.21	\$8.60	\$16.64	\$0.00	\$65.45
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) HEAT & FROST INSULATORS LOCAL 6 (BOSTON)	09/01/2020	\$49.00	\$13.80	\$17.14	\$0.00	\$79.94
	09/01/2021	\$51.40	\$13.80	\$17.14	\$0.00	\$82.34
	09/01/2022	\$53.85	\$13.80	\$17.14	\$0.00	\$84.79

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston

Effective Date - 09/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.50	\$13.80	\$12.42	\$0.00	\$50.72
2	60	\$29.40	\$13.80	\$13.36	\$0.00	\$56.56
3	70	\$34.30	\$13.80	\$14.31	\$0.00	\$62.41
4	80	\$39.20	\$13.80	\$15.25	\$0.00	\$68.25

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.70	\$13.80	\$12.42	\$0.00	\$51.92
2	60	\$30.84	\$13.80	\$13.36	\$0.00	\$58.00
3	70	\$35.98	\$13.80	\$14.31	\$0.00	\$64.09
4	80	\$41.12	\$13.80	\$15.25	\$0.00	\$70.17

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER IRONWORKERS LOCAL 7 (LAWRENCE AREA)	09/16/2020	\$44.25	\$8.10	\$25.10	\$0.00	\$77.45
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Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - IRONWORKER - Local 7 Lawrence

Effective Date - 09/16/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$26.55	\$8.10	\$25.10	\$0.00	\$59.75
2	70	\$30.98	\$8.10	\$25.10	\$0.00	\$64.18
3	75	\$33.19	\$8.10	\$25.10	\$0.00	\$66.39
4	80	\$35.40	\$8.10	\$25.10	\$0.00	\$68.60
5	85	\$37.61	\$8.10	\$25.10	\$0.00	\$70.81
6	90	\$39.83	\$8.10	\$25.10	\$0.00	\$73.03

Notes:

Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 2	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

LABORER LABORERS - ZONE 2	06/01/2021	\$35.00	\$8.60	\$16.64	\$0.00	\$60.24
	12/01/2021	\$35.91	\$8.60	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.81	\$8.60	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.66	\$8.60	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.56	\$8.60	\$16.64	\$0.00	\$63.80
	12/01/2023	\$39.46	\$8.60	\$16.64	\$0.00	\$64.70

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - LABORER - Zone 2

Effective Date - 06/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$21.00	\$8.60	\$16.64	\$0.00	\$46.24
2	70	\$24.50	\$8.60	\$16.64	\$0.00	\$49.74
3	80	\$28.00	\$8.60	\$16.64	\$0.00	\$53.24
4	90	\$31.50	\$8.60	\$16.64	\$0.00	\$56.74

Effective Date - 12/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$21.55	\$8.60	\$16.64	\$0.00	\$46.79
2	70	\$25.14	\$8.60	\$16.64	\$0.00	\$50.38
3	80	\$28.73	\$8.60	\$16.64	\$0.00	\$53.97
4	90	\$32.32	\$8.60	\$16.64	\$0.00	\$57.56

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.00	\$8.60	\$16.64	\$0.00	\$60.24
	12/01/2021	\$35.91	\$8.60	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.81	\$8.60	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.66	\$8.60	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.56	\$8.60	\$16.64	\$0.00	\$63.80
	12/01/2023	\$39.46	\$8.60	\$16.64	\$0.00	\$64.70

For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.00	\$8.60	\$16.64	\$0.00	\$60.24
	12/01/2021	\$35.91	\$8.60	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.81	\$8.60	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.66	\$8.60	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.56	\$8.60	\$16.64	\$0.00	\$63.80
	12/01/2023	\$39.46	\$8.60	\$16.64	\$0.00	\$64.70

For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.09	\$8.60	\$16.70	\$0.00	\$60.39
	12/01/2021	\$36.00	\$8.60	\$16.70	\$0.00	\$61.30
	06/01/2022	\$36.90	\$8.60	\$16.70	\$0.00	\$62.20
	12/01/2022	\$37.75	\$8.60	\$16.70	\$0.00	\$63.05
	06/01/2023	\$38.65	\$8.60	\$16.70	\$0.00	\$63.95
	12/01/2023	\$39.55	\$8.60	\$16.70	\$0.00	\$64.85

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
	For apprentice rates see "Apprentice- LABORER"					
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.00	\$8.60	\$16.64	\$0.00	\$60.24
	12/01/2021	\$35.91	\$8.60	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.81	\$8.60	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.66	\$8.60	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.56	\$8.60	\$16.64	\$0.00	\$63.80
	12/01/2023	\$39.46	\$8.60	\$16.64	\$0.00	\$64.70
	For apprentice rates see "Apprentice- LABORER"					
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.00	\$8.60	\$16.64	\$0.00	\$60.24
	12/01/2021	\$35.91	\$8.60	\$16.64	\$0.00	\$61.15
	06/01/2022	\$36.81	\$8.60	\$16.64	\$0.00	\$62.05
	12/01/2022	\$37.66	\$8.60	\$16.64	\$0.00	\$62.90
	06/01/2023	\$38.56	\$8.60	\$16.64	\$0.00	\$63.80
	12/01/2023	\$39.46	\$8.60	\$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>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
	For apprentice rates see "Apprentice- LABORER"					
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2021	\$42.57	\$11.39	\$20.14	\$0.00	\$74.10
	08/01/2021	\$43.69	\$11.39	\$20.30	\$0.00	\$75.38
	02/01/2022	\$44.16	\$11.39	\$20.30	\$0.00	\$75.85

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.29	\$11.39	\$20.14	\$0.00	\$52.82
2	60	\$25.54	\$11.39	\$20.14	\$0.00	\$57.07
3	70	\$29.80	\$11.39	\$20.14	\$0.00	\$61.33
4	80	\$34.06	\$11.39	\$20.14	\$0.00	\$65.59
5	90	\$38.31	\$11.39	\$20.14	\$0.00	\$69.84

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.85	\$11.39	\$20.30	\$0.00	\$53.54
2	60	\$26.21	\$11.39	\$20.30	\$0.00	\$57.90
3	70	\$30.58	\$11.39	\$20.30	\$0.00	\$62.27
4	80	\$34.95	\$11.39	\$20.30	\$0.00	\$66.64
5	90	\$39.32	\$11.39	\$20.30	\$0.00	\$71.01

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH	02/01/2021	\$55.77	\$11.39	\$22.08	\$0.00	\$89.24
BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2021	\$57.17	\$11.39	\$22.24	\$0.00	\$90.80
	02/01/2022	\$57.74	\$11.39	\$22.24	\$0.00	\$91.37

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.89	\$11.39	\$22.08	\$0.00	\$61.36
2	60	\$33.46	\$11.39	\$22.08	\$0.00	\$66.93
3	70	\$39.04	\$11.39	\$22.08	\$0.00	\$72.51
4	80	\$44.62	\$11.39	\$22.08	\$0.00	\$78.09
5	90	\$50.19	\$11.39	\$22.08	\$0.00	\$83.66

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.59	\$11.39	\$22.24	\$0.00	\$62.22
2	60	\$34.30	\$11.39	\$22.24	\$0.00	\$67.93
3	70	\$40.02	\$11.39	\$22.24	\$0.00	\$73.65
4	80	\$45.74	\$11.39	\$22.24	\$0.00	\$79.37
5	90	\$51.45	\$11.39	\$22.24	\$0.00	\$85.08

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2) <i>MILLWRIGHTS LOCAL 1121 - Zone 2</i>	03/01/2021	\$39.42	\$8.58	\$21.57	\$0.00	\$69.57
	01/03/2022	\$40.67	\$8.58	\$21.57	\$0.00	\$70.82
	01/02/2023	\$41.92	\$8.58	\$21.57	\$0.00	\$72.07

Apprentice - MILLWRIGHT - Local 1121 Zone 2

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$21.68	\$8.58	\$5.72	\$0.00	\$35.98
2	65	\$25.62	\$8.58	\$17.93	\$0.00	\$52.13
3	75	\$29.57	\$8.58	\$18.98	\$0.00	\$57.13
4	85	\$33.51	\$8.58	\$20.01	\$0.00	\$62.10

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$22.37	\$8.58	\$5.72	\$0.00	\$36.67
2	65	\$26.44	\$8.58	\$17.93	\$0.00	\$52.95
3	75	\$30.50	\$8.58	\$18.98	\$0.00	\$58.06
4	85	\$34.57	\$8.58	\$20.01	\$0.00	\$63.16

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:1:5

MORTAR MIXER LABORERS - ZONE 2	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2021	\$23.40	\$13.75	\$15.80	\$0.00	\$52.95
	12/01/2021	\$23.98	\$13.75	\$15.80	\$0.00	\$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2021	\$28.26	\$13.75	\$15.80	\$0.00	\$57.81
	12/01/2021	\$28.94	\$13.75	\$15.80	\$0.00	\$58.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II OPERATING ENGINEERS LOCAL 4	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) PAINTERS LOCAL 35 - ZONE 2	01/01/2021	\$52.06	\$8.25	\$22.75	\$0.00	\$83.06

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.03	\$8.25	\$0.00	\$0.00	\$34.28
2	55	\$28.63	\$8.25	\$6.16	\$0.00	\$43.04
3	60	\$31.24	\$8.25	\$6.72	\$0.00	\$46.21
4	65	\$33.84	\$8.25	\$7.28	\$0.00	\$49.37
5	70	\$36.44	\$8.25	\$19.39	\$0.00	\$64.08
6	75	\$39.05	\$8.25	\$19.95	\$0.00	\$67.25
7	80	\$41.65	\$8.25	\$20.51	\$0.00	\$70.41
8	90	\$46.85	\$8.25	\$21.63	\$0.00	\$76.73

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2021	\$42.96	\$8.25	\$22.75	\$0.00	\$73.96
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* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.48	\$8.25	\$0.00	\$0.00	\$29.73
2	55	\$23.63	\$8.25	\$6.16	\$0.00	\$38.04
3	60	\$25.78	\$8.25	\$6.72	\$0.00	\$40.75
4	65	\$27.92	\$8.25	\$7.28	\$0.00	\$43.45
5	70	\$30.07	\$8.25	\$19.39	\$0.00	\$57.71
6	75	\$32.22	\$8.25	\$19.95	\$0.00	\$60.42
7	80	\$34.37	\$8.25	\$20.51	\$0.00	\$63.13
8	90	\$38.66	\$8.25	\$21.63	\$0.00	\$68.54

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	01/01/2021	\$41.02	\$8.25	\$22.75	\$0.00	\$72.02
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PAINTERS LOCAL 35 - ZONE 2

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 01/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.81	\$8.25	\$0.00	\$0.00	\$28.06
2	55	\$21.79	\$8.25	\$6.16	\$0.00	\$36.20
3	60	\$23.77	\$8.25	\$6.72	\$0.00	\$38.74
4	65	\$25.75	\$8.25	\$7.28	\$0.00	\$41.28
5	70	\$27.73	\$8.25	\$19.39	\$0.00	\$55.37
6	75	\$29.72	\$8.25	\$19.95	\$0.00	\$57.92
7	80	\$31.70	\$8.25	\$20.51	\$0.00	\$60.46
8	90	\$35.66	\$8.25	\$21.63	\$0.00	\$65.54

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2021	\$35.78	\$12.91	\$14.82	\$0.00	\$63.51
	08/01/2021	\$35.78	\$13.41	\$14.82	\$0.00	\$64.01
	12/01/2021	\$35.78	\$13.41	\$16.01	\$0.00	\$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i> For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59

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

PIPEFITTER & STEAMFITTER <i>PIPEFITTERS LOCAL 537</i>	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
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Apprentice - PIPEFITTER - Local 537

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$23.18	\$11.70	\$8.25	\$0.00	\$43.13
2	45	\$26.07	\$11.70	\$20.24	\$0.00	\$58.01
3	60	\$34.76	\$11.70	\$20.24	\$0.00	\$66.70
4	70	\$40.56	\$11.70	\$20.24	\$0.00	\$72.50
5	80	\$46.35	\$11.70	\$20.24	\$0.00	\$78.29

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.
 Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER LABORERS - ZONE 2	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95

For apprentice rates see "Apprentice- LABORER"

PLUMBERS & GASFITTERS PLUMBERS & GASFITTERS LOCAL 12	03/01/2021	\$60.19	\$13.57	\$17.26	\$0.00	\$91.02
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Apprentice - PLUMBER/GASFITTER - Local 12

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$21.07	\$13.57	\$6.24	\$0.00	\$40.88
2	40	\$24.08	\$13.57	\$7.08	\$0.00	\$44.73
3	55	\$33.10	\$13.57	\$9.63	\$0.00	\$56.30
4	65	\$39.12	\$13.57	\$11.33	\$0.00	\$64.02
5	75	\$45.14	\$13.57	\$13.03	\$0.00	\$71.74

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
 Step4 with lic\$67.89, Step5 with lic\$75.59

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) PIPEFITTERS LOCAL 537	03/01/2021	\$57.94	\$11.70	\$20.24	\$0.00	\$89.88
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For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR LABORERS - ZONE 2	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	06/01/2021	\$36.00	\$8.60	\$16.64	\$0.00	\$61.24
	12/01/2021	\$36.91	\$8.60	\$16.64	\$0.00	\$62.15
	06/01/2022	\$37.81	\$8.60	\$16.64	\$0.00	\$63.05
	12/01/2022	\$38.66	\$8.60	\$16.64	\$0.00	\$63.90
	06/01/2023	\$39.56	\$8.60	\$16.64	\$0.00	\$64.80
	12/01/2023	\$40.46	\$8.60	\$16.64	\$0.00	\$65.70
For apprentice rates see "Apprentice- LABORER"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.73	\$13.75	\$15.80	\$0.00	\$80.28
	12/01/2021	\$51.88	\$13.75	\$15.80	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.73	\$13.75	\$15.80	\$0.00	\$80.28
	12/01/2021	\$51.88	\$13.75	\$15.80	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$33.40	\$13.75	\$15.80	\$0.00	\$62.95
	12/01/2021	\$34.19	\$13.75	\$15.80	\$0.00	\$63.74
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 170 - J.G. MacLellan (Lowell)</i>	05/01/2021	\$25.50	\$10.01	\$6.35	\$0.00	\$41.86
	01/01/2022	\$25.50	\$10.37	\$6.35	\$0.00	\$42.22
	05/01/2022	\$25.85	\$10.37	\$6.35	\$0.00	\$42.57
	01/01/2023	\$25.85	\$10.77	\$6.35	\$0.00	\$42.97
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofing &Roofing Damproofg) <i>ROOFERS LOCAL 33</i>	02/01/2021	\$46.60	\$12.28	\$17.15	\$0.00	\$76.03
	08/01/2021	\$48.03	\$12.28	\$17.15	\$0.00	\$77.46
	02/01/2022	\$49.46	\$12.28	\$17.15	\$0.00	\$78.89

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ROOFER - Local 33

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.30	\$12.28	\$4.31	\$0.00	\$39.89
2	60	\$27.96	\$12.28	\$17.15	\$0.00	\$57.39
3	65	\$30.29	\$12.28	\$17.15	\$0.00	\$59.72
4	75	\$34.95	\$12.28	\$17.15	\$0.00	\$64.38
5	85	\$39.61	\$12.28	\$17.15	\$0.00	\$69.04

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.02	\$12.28	\$4.31	\$0.00	\$40.61
2	60	\$28.82	\$12.28	\$17.15	\$0.00	\$58.25
3	65	\$31.22	\$12.28	\$17.15	\$0.00	\$60.65
4	75	\$36.02	\$12.28	\$17.15	\$0.00	\$65.45
5	85	\$40.83	\$12.28	\$17.15	\$0.00	\$70.26

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:**

ROOFER SLATE / TILE / PRECAST CONCRETE ROOFERS LOCAL 33	02/01/2021	\$46.85	\$12.28	\$17.15	\$0.00	\$76.28
	08/01/2021	\$48.28	\$12.28	\$17.15	\$0.00	\$77.71
	02/01/2022	\$49.71	\$12.28	\$17.15	\$0.00	\$79.14
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 17 - A	02/01/2021	\$51.67	\$13.65	\$24.57	\$2.70	\$92.59
	08/01/2021	\$53.42	\$13.65	\$24.57	\$2.75	\$94.39
	02/01/2022	\$55.17	\$13.65	\$24.57	\$2.80	\$96.19

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 17-A

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$21.70	\$13.65	\$5.89	\$0.00	\$41.24
2	42	\$21.70	\$13.65	\$5.89	\$0.00	\$41.24
3	47	\$24.28	\$13.65	\$11.13	\$1.48	\$50.54
4	47	\$24.28	\$13.65	\$11.13	\$1.48	\$50.54
5	52	\$26.87	\$13.65	\$12.08	\$1.58	\$54.18
6	52	\$26.87	\$13.65	\$12.33	\$1.59	\$54.44
7	60	\$31.00	\$13.65	\$13.70	\$1.76	\$60.11
8	65	\$33.59	\$13.65	\$14.65	\$1.88	\$63.77
9	75	\$38.75	\$13.65	\$16.56	\$2.08	\$71.04
10	85	\$43.92	\$13.65	\$17.96	\$2.28	\$77.81

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	42	\$22.44	\$13.65	\$5.89	\$0.00	\$41.98
2	42	\$22.44	\$13.65	\$5.89	\$0.00	\$41.98
3	47	\$25.11	\$13.65	\$11.13	\$1.48	\$51.37
4	47	\$25.11	\$13.65	\$11.13	\$1.48	\$51.37
5	52	\$27.78	\$13.65	\$12.08	\$1.58	\$55.09
6	52	\$27.78	\$13.65	\$12.33	\$1.59	\$55.35
7	60	\$32.05	\$13.65	\$13.70	\$1.76	\$61.16
8	65	\$34.72	\$13.65	\$14.65	\$1.88	\$64.90
9	75	\$40.07	\$13.65	\$16.56	\$2.08	\$72.36
10	85	\$45.41	\$13.65	\$17.96	\$2.28	\$79.30

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>	06/01/2021	\$36.24	\$12.91	\$14.82	\$0.00	\$63.97
	08/01/2021	\$36.24	\$13.41	\$14.82	\$0.00	\$64.47
	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>	06/01/2021	\$36.53	\$12.91	\$14.82	\$0.00	\$64.26
	08/01/2021	\$36.53	\$13.41	\$14.82	\$0.00	\$64.76
	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>	03/01/2021	\$62.45	\$10.00	\$21.25	\$0.00	\$93.70

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$21.86	\$10.00	\$11.99	\$0.00	\$43.85
2	40	\$24.98	\$10.00	\$12.70	\$0.00	\$47.68
3	45	\$28.10	\$10.00	\$13.41	\$0.00	\$51.51
4	50	\$31.23	\$10.00	\$14.13	\$0.00	\$55.36
5	55	\$34.35	\$10.00	\$14.84	\$0.00	\$59.19
6	60	\$37.47	\$10.00	\$15.55	\$0.00	\$63.02
7	65	\$40.59	\$10.00	\$16.26	\$0.00	\$66.85
8	70	\$43.72	\$10.00	\$16.98	\$0.00	\$70.70
9	75	\$46.84	\$10.00	\$17.69	\$0.00	\$74.53
10	80	\$49.96	\$10.00	\$18.40	\$0.00	\$78.36

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 <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 103</i>	03/01/2021	\$42.11	\$13.00	\$17.88	\$0.00	\$72.99
	09/01/2021	\$43.77	\$13.00	\$18.00	\$0.00	\$74.77
	03/01/2022	\$45.27	\$13.00	\$18.12	\$0.00	\$76.39
	09/01/2022	\$46.99	\$13.00	\$18.24	\$0.00	\$78.23
	03/01/2023	\$48.54	\$13.00	\$18.37	\$0.00	\$79.91

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 103

Effective Date - 03/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$18.95	\$13.00	\$0.57	\$0.00	\$32.52
2	45	\$18.95	\$13.00	\$0.57	\$0.00	\$32.52
3	50	\$21.06	\$13.00	\$14.51	\$0.00	\$48.57
4	50	\$21.06	\$13.00	\$14.51	\$0.00	\$48.57
5	55	\$23.16	\$13.00	\$14.84	\$0.00	\$51.00
6	60	\$25.27	\$13.00	\$15.18	\$0.00	\$53.45
7	65	\$27.37	\$13.00	\$15.52	\$0.00	\$55.89
8	70	\$29.48	\$13.00	\$15.85	\$0.00	\$58.33
9	75	\$31.58	\$13.00	\$16.20	\$0.00	\$60.78
10	80	\$33.69	\$13.00	\$16.53	\$0.00	\$63.22

Effective Date - 09/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$19.70	\$13.00	\$0.59	\$0.00	\$33.29
2	45	\$19.70	\$13.00	\$0.59	\$0.00	\$33.29
3	50	\$21.89	\$13.00	\$14.57	\$0.00	\$49.46
4	50	\$21.89	\$13.00	\$14.57	\$0.00	\$49.46
5	55	\$24.07	\$13.00	\$14.91	\$0.00	\$51.98
6	60	\$26.26	\$13.00	\$15.26	\$0.00	\$54.52
7	65	\$28.45	\$13.00	\$15.59	\$0.00	\$57.04
8	70	\$30.64	\$13.00	\$15.94	\$0.00	\$59.58
9	75	\$32.83	\$13.00	\$16.28	\$0.00	\$62.11
10	80	\$35.02	\$13.00	\$16.63	\$0.00	\$64.65

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS	02/01/2021	\$54.69	\$11.39	\$22.09	\$0.00	\$88.17
BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2021	\$56.09	\$11.39	\$22.25	\$0.00	\$89.73
	02/01/2022	\$56.68	\$11.39	\$22.25	\$0.00	\$90.32

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.35	\$11.39	\$22.09	\$0.00	\$60.83
2	60	\$32.81	\$11.39	\$22.09	\$0.00	\$66.29
3	70	\$38.28	\$11.39	\$22.09	\$0.00	\$71.76
4	80	\$43.75	\$11.39	\$22.09	\$0.00	\$77.23
5	90	\$49.22	\$11.39	\$22.09	\$0.00	\$82.70

Effective Date - 08/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.05	\$11.39	\$22.25	\$0.00	\$61.69
2	60	\$33.65	\$11.39	\$22.25	\$0.00	\$67.29
3	70	\$39.26	\$11.39	\$22.25	\$0.00	\$72.90
4	80	\$44.87	\$11.39	\$22.25	\$0.00	\$78.51
5	90	\$50.48	\$11.39	\$22.25	\$0.00	\$84.12

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2021	\$42.07	\$8.60	\$17.72	\$0.00	\$68.39
	12/01/2021	\$43.08	\$8.60	\$17.72	\$0.00	\$69.40
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2021	\$40.79	\$8.60	\$17.72	\$0.00	\$67.11
	12/01/2021	\$41.80	\$8.60	\$17.72	\$0.00	\$68.12
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2021	\$40.67	\$8.60	\$17.72	\$0.00	\$66.99
	12/01/2021	\$41.68	\$8.60	\$17.72	\$0.00	\$68.00
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.19	\$13.75	\$15.80	\$0.00	\$79.74
	12/01/2021	\$51.33	\$13.75	\$15.80	\$0.00	\$80.88
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2021	\$36.82	\$12.91	\$14.82	\$0.00	\$64.55
	08/01/2021	\$36.82	\$13.41	\$14.82	\$0.00	\$65.05
	12/01/2021	\$36.82	\$13.41	\$16.01	\$0.00	\$66.24
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	06/01/2021	\$52.90	\$8.60	\$18.17	\$0.00	\$79.67
	12/01/2021	\$53.91	\$8.60	\$18.17	\$0.00	\$80.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	06/01/2021	\$54.90	\$8.60	\$18.17	\$0.00	\$81.67
	12/01/2021	\$55.91	\$8.60	\$18.17	\$0.00	\$82.68
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2021	\$44.97	\$8.60	\$18.17	\$0.00	\$71.74
	12/01/2021	\$45.98	\$8.60	\$18.17	\$0.00	\$72.75
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2021	\$46.97	\$8.60	\$18.17	\$0.00	\$73.74
	12/01/2021	\$47.98	\$8.60	\$18.17	\$0.00	\$74.75
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2021	\$36.24	\$12.91	\$14.82	\$0.00	\$63.97
	08/01/2021	\$36.24	\$13.41	\$14.82	\$0.00	\$64.47
	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2021	\$35.25	\$8.60	\$16.64	\$0.00	\$60.49
	12/01/2021	\$36.16	\$8.60	\$16.64	\$0.00	\$61.40
	06/01/2022	\$37.06	\$8.60	\$16.64	\$0.00	\$62.30
	12/01/2022	\$37.91	\$8.60	\$16.64	\$0.00	\$63.15
	06/01/2023	\$38.81	\$8.60	\$16.64	\$0.00	\$64.05
	12/01/2023	\$39.71	\$8.60	\$16.64	\$0.00	\$64.95
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2021	\$50.73	\$13.75	\$15.80	\$0.00	\$80.28
	12/01/2021	\$51.88	\$13.75	\$15.80	\$0.00	\$81.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
WATER METER INSTALLER <i>PLUMBERS & GASFITTERS LOCAL 12</i>	03/01/2021	\$60.19	\$13.57	\$17.26	\$0.00	\$91.02
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$29.67	\$9.25	\$1.89	\$0.00	\$40.81
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$10.27	\$0.00	\$61.55
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$34.62	\$9.25	\$10.07	\$0.00	\$53.94
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$42.03	\$9.25	\$14.35	\$0.00	\$65.63
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$37.09	\$9.25	\$10.87	\$0.00	\$57.21
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$27.20	\$9.25	\$1.82	\$0.00	\$38.27
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$22.25	\$9.25	\$1.82	\$0.00	\$33.32
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	08/30/2020	\$49.45	\$9.25	\$17.48	\$0.00	\$76.18

Apprentice - LINEMAN (Outside Electrical) - East Local 104

Effective Date - 08/30/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$29.67	\$9.25	\$3.39	\$0.00	\$42.31
2	65	\$32.14	\$9.25	\$3.46	\$0.00	\$44.85
3	70	\$34.62	\$9.25	\$3.54	\$0.00	\$47.41
4	75	\$37.09	\$9.25	\$5.11	\$0.00	\$51.45
5	80	\$39.56	\$9.25	\$5.19	\$0.00	\$54.00
6	85	\$42.03	\$9.25	\$5.26	\$0.00	\$56.54
7	90	\$44.51	\$9.25	\$7.34	\$0.00	\$61.10

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$30.73	\$4.70	\$3.17	\$0.00	\$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/04/2019	\$28.93	\$4.70	\$3.14	\$0.00	\$36.77

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.